

ENVIRONMENTAL ASSESSMENT

VOLUME 1 OF 3

**ENVIRONMENTAL ASSESSMENT
FOR PACIFIC NATIONAL TRAIN
SUPPORT FACILITY AT GRETA IN THE
CESSNOCK CITY COUNCIL LOCAL
GOVERNMENT AREA**



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LIST OF ABBREVIATIONS

AFG	Aboriginal Focus Group
AHIMS	Aboriginal Heritage Information Management System
ASS	Acid Sulphate Soils
AASS	Actual Acid Sulphate Soils
AQMN	Air Quality Monitoring Network
AADTF	Annual Average Daily Traffic flow

APZ	Asset Protection Zones
ANZECC	Australia and New Zealand Environment and Conservation Council
ADG Code	Australian Code for the Transport of Dangerous Goods by Road and Rail
AHD	Australian Height Datum
ARTC	Australian Rail Track Corporation
AS	Australian Standard
BCA	Building Code of Australia
BPA	Bushfire Protection Assessment
CO2	Carbon Dioxide
CCC	Cessnock City Council
DCP	Cessnock City Council Development Control Plan
CWSS	Cessnock City Wide Settlement Strategy
DCP 2009	Cessnock Development Control Plan 2009
COD	Chemical Oxygen Demand
CFCs	Chloro-fluorocarbons
CIS	Community Information Session
CEMP	Construction and Environmental Management Plan
CNMP	Construction Noise Management Plan
CTMP	Construction Traffic Management Plan
CLM Act	Contaminated Land Management Act 1997
CAA	Controlled Activity Approval
BFPLM	Council Bushfire Prone Land Maps
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DEWHA	Department of Environment, Water, Heritage and the Arts
DII	Department of Industry and Investment
DOP	Department of Planning
DPI	Department of Primary Industries
DGR	Director-General's Requirements
ESD	Ecologically Sustainable Development
EEC	Endangered Ecological Community
EA	Energy Australia
EPL	Environment Protection Licence
EA	Environmental Assessment
ECRTN	Environmental Criteria for Road Traffic Noise
ENM	Environmental Noise Model
EP&A Act	Environmental Planning and Administration Act 1979
EPI	Environmental Planning Instruments
EPBC Act	Environmental Protection and Biodiversity Conservation Act
ERA	Environmental Risk Analysis
ESCP	Erosion and Sediment Control Plan
EVDV	Estimated Partial VDV
FTBE	Full Train Brake Examination
GDP	Gross Domestic Product
GPT	Gross Pollutant Trap
GLC	Ground Level Concentration
GW	Groundwater Well
Ha	Hectares

HIS	Heritage Impact Statement
HLAP	Hunter Local Action Plan
HVRCCS	Hunter Valley (Rail) Corridor Capacity Strategy
HWC	Hunter Water Corporation
KL	Kilo Litres
LCU	Landscape Character Units
LPG	Liquid Petroleum Gas
LEP	Local Environmental Plan
LGA	Local Government Area
LHCCREMS	Lower Hunter and Central Coast Regional Environmental Management Strategy
LHRCP	Lower Hunter Regional Conservation Plan
LHRS	Lower Hunter Regional Strategy
MNR	Main Northern Railway
mtpa	Mega-tonne per annum
m	Metres
MPS	Metres Per Second
MSB	Mine Subsidence Board
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
The Model Provisions	Model Provisions 1980
NES	National Environmental Significance
NPW Act	National Parks and Wildlife Act 1974
NSW	New South Wales
NCIG	Newcastle Coal Infrastructure Group
NPC	Newcastle Port Corporation
NW Act	Noxious Weeds Act 1993
The Strategy	NSW State Infrastructure Strategy
NSW State Plan	NSW State Plan, a New Direction for NSW
OOC	Out of Course
O3	Ozone
PN	Pacific National
PFM	Planning Focus Meeting
PWCS	Port Waratah Coal Services
PASS	Potential Acid Sulphate Soils
PAD	Potential Archaeological Deposit
PCR	Preliminary Contamination Report
PHA	Preliminary Hazard Assessment
PSNL	Project Specific Noise Levels
QR	QR National (Queensland Rail)
ROTAP	Rare or Threatened Australian Plant
RAP	Remedial Action Plan
Roads Act	Roads Act 1993 (Roads Act)
RTA	Roads and Traffic Authority
RMS	Root Mean Square
RTA Guide	RTA Guide to Traffic Generating Development
RCM	Rural Capability Map
RFS	Rural Fire Service
SM	Scheduled Maintenance

s	Seconds
STP	Shovel Test Pits
SKM	Sinclair Knight Merz
SPL	Sound Power Level
SCLP	Stakeholder and Community Liaison Plan
SEPPs	State Environmental Planning Policies
SEPP Infrastructure	State Environmental Planning Policy (Infrastructure) 2007
SEPP Major Projects	State Environmental Planning Policy (Major Projects) 2005
SEPP Rural Lands	State Environmental Planning Policy (Rural Lands) 2009
SEPP 33	State Environmental Planning Policy 33 – Hazardous and Offensive Development
SEPP 44	State Environmental Planning Policy 44 (SEPP 44)
SEPP 55	State Environmental Planning Policy 55 – Remediation of Land
SOC	Statement of Commitments
SWMP	Surface Water Management Plan
POEO Act	The Protection of the Environment Operations Act 1997 (NSW)
TS Act	Threatened Species Act
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
TSF	Train Support Facility
TA Act	Transport Administration Act 1988
UTM	Unit Train Maintenance
VDV	Vibration Dose Value
WMP	Waste Management Plan
Water Act	Water Act 1912
WM Act	Water Management Act 2000
WQCP	Water Quality Control Ponds

I. EXECUTIVE SUMMARY

INTRODUCTION

This Environmental Assessment has been prepared in accordance with the Director General's Requirements and Supplementary Director General's Requirements issued for the Project. The Project is being undertaken pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979*. It is a permissible land use within the 1(a) Rural "A" zone pursuant to the *Cessnock Local Environmental Plan 1989*. The Project seeks consent to construct and operate a Train Support Facility (TSF) (hereafter referred to as the Project) and would include refuelling and maintenance activities. The Project is to be located to the west of the existing township of Greta, approximately 50 kilometres north-west of Newcastle and 20 kilometres north of Cessnock in the Hunter Valley region of New South Wales.

BACKGROUND

The export of coal and coke from New South Wales in 2007 / 2008 was \$6.2 billion with the vast majority of this coal leaving via the Port of Newcastle. The export of coal through the Port of Newcastle is predicted to nearly double over the next five years. The Hunter Valley coal chain is responsible for the efficient delivery of coal to the Port. Pacific National is a critical link in the coal chain, providing bulk haulage of approximately 85% of all Hunter Valley coal.

This report provides the Environmental Assessment for a TSF. The Project allows Pacific National to expand their services in the Hunter Valley and to meet an objective to free up coal chain capacity in operating from the existing provisioning facilities at the Port end of the rail system. The Project would operate as a refuelling, wash-down and minor maintenance base for locomotives and wagons on the down main of the Main Northern Railway.

SITE DESCRIPTION

The Project is proposed to be located at Greta in the Local Government Area of Cessnock. The site is located between the existing Main Northern Railway, which is currently being expanded to provide a third rail line between Maitland and Whittingham, and the proposed Hunter Expressway (extension of the F3 Freeway) which recently received Federal Government funding to allow commencement of works.

The subject site is an irregular shaped parcel of land. It comprises 46.57 hectares and is legally described as Lot 1 in DP 1129191. The site has frontage to Mansfield Street. The site extends approximately 2.4 kilometres north from the southern boundary of the lot and is approximately 0.5 kilometres wide at its greatest width.

The general grade of the site runs west to east. A small section of the site adjacent to the south-eastern boundary has been cleared and a horse training track has been established. The remainder of the site is vegetated to varying extents. The vegetation on site typically comprises a mix of Spotted Gum – Iron Bark Forest and Forest Red Gum – Iron Bark Forest. Some areas of regenerating shrub land are also present on site. Two watercourses traverse the site including Sawyers Creek in the southern portion of the site, and an unnamed tributary of Anvil Creek in the northern portion of the site. A number of minor perennial streams also cross the site, which pass beneath the existing railway embankment via brick culverts.

Evidence of underground mine workings have been found on site with a portion of the site known to have been affected by subsidence in the past. A number of Indigenous and Non-Indigenous artefacts have also been found on site.

With the exception of the residents directly adjacent to the south, the site is generally well distanced from sensitive receivers. The fringe areas of Greta lie approximately 1 kilometre from the centre of the site; the centre of Greta approximately 1.5 kilometres; and North Rothbury and Branxton approximately 3 kilometres from the site.

PROJECT DESCRIPTION

The Project would include the infrastructure required to service locomotives and wagons as well as an administration facility and ancillary development associated with the Project. The Project would also include connection of the rail tracks within the facility to the Main Northern Railway. As ARTC have not yet acquired any property as part of the proposed third track, this assessment covers Pacific National's existing holding which may include land acquired by ARTC in the future.

There would be a construction and operational component to the Project. As detailed below, it is proposed to stage the construction of the Project into three stages. Once all stages are completed the following facilities would be provided on site:-

- **Five Rail Tracks**, including three provisioning tracks and two maintenance tracks.
- **Locomotive Maintenance Facilities**, including the Provisioning and Inspection Facility; a Service Facility; a Locomotive Wash Facility; and a Wheel Lathe Facility.

- **Wagon Maintenance Facilities**, including A Wagon Maintenance Hard Stand Area; Wagon Maintenance Support Facility; and Rolling Stock in Ground Wheel Lathe Facility.
- **Administration Facilities**, including Administration and Office Facilities equipped with a canteen and amenities facilities.
- **Road Vehicles Service Centre**, including Truck and Vehicle Storage; Store room; amenities; and lunch room.
- **Ancillary Facilities**, including Fuel Farm containing diesel tanks. Diesel would be stored on site in accordance with AS1940-2004, Electrical Infrastructure; Service vehicles garage; Water storage and water treatment facilities; fencing, including security fencing along the western boundary; Car parking and access roadways; Lighting; and Landscaping.

The construction works for Stage 1 operations would be divided into three core areas being:-

1. Initial vegetation clearing and bulk earthworks on the site including blasting and crushing activities.
2. Laying of tracks.
3. Construction of buildings and their ancillary requirements such as water tanks and waste water facilities.

Clearing and bulk earthworks, including blasting, is likely to create the largest impact on nearby residents primarily as a result of dust and noise generated by the construction activities, these impacts would be managed on site through a number of mitigation measures discussed throughout this report. Preliminary geotechnical investigations indicate areas exist within the proposed development site that requires blasting to enable final site levels to be achieved. Blasting will be required to excavate approximately 40,000m³ of rock between chainages 211250 and 211650, and, 10,000m³ of rock between chainages 213250 and 213450. The location of the proposed blasting areas is provided in **Figure 33** in Section 9.1.4.

During the bulk earthworks phase the number of construction workers on site is not expected to be significant with around only 30 employees. It is expected that this phase of construction works would take approximately six months. Following the bulk earthworks phase; construction of the rail tracks; buildings and ancillary site features would commence. This building phase is likely to have duration between six to eight months.

During this phase the environmental impacts are expected to be less however, the number of construction works accessing the site is likely to increase to approximately 100. To mitigate potential construction traffic impacts it is proposed that the standard hours of construction work on site be between 7:00am and 6:00pm.

Construction for operational Stages 2 and 3 (see below) is likely to last 12 months for each stage, and will comprise the erection of additional buildings and laying additional rail tracks. The impacts of these works are not expected to be significant.

24 hour operation of the Project is proposed with staff on site to comprise a mixture of shift workers for maintenance shifts; train drivers for crew changeovers; and administration and management staff. As all facilities would not initially be required by Pacific National, three operation stages of the Project are proposed.

Activities on site are expected to intensify as each stage is commissioned. Stage 1 is proposed to have a 12-14 month construction duration commencing September 2010. Stage 1 comprises three core elements being:-

- Stage 1A – Access road
- Stage 1B – Bulk earthworks
- Stage 1C – Site facilities including:-
 - Tracks 1, 2 and 3.
 - Provisioning Facility to service three tracks.
 - Facility access road and infrastructure necessary to support provisioning (oil storage, fire systems including water tanks, water and electricity).
 - Diesel storage to be a minimum of 1.0 million litres (with allowance to grow to 2.0 million litres in Stages 2 and 3).
 - Wagon maintenance facility capable of basic administration and maintenance.
 - Road base area for wheel sets and bogies.
 - Locomotive maintenance facility access track on which a basic/temporary locomotive wash bay will be located.
 - Road Vehicles Service Centre.
 - Car Park.

- Turnouts to main line.
- Water quality system including detention basins.
- Ancillary development including site fencing and access gate, landscaping etc.

For Stage 1, a section of the proposed loco maintenance centre access siding to be equipped with a loco wash-down facility would also be constructed.

The track length servicing this facility would be sufficient length to enable 160 metres of wagons to be stored between the wash-down and the dead end of the track.

Stage 2 is proposed to have a 12 month construction duration commencing September 2013, allowing operation in September 2014. At the end of Stage 2 it is proposed that the following additional facilities would be present on site:-

- Construction of maintenance and inspection Tracks 4 and 5.
- Relocate locomotive wash bay towards future loco maintenance facility.
- Construct wagon storage sidings.
- Construct administration building.
- Diesel storage to increase from 1.0 million litres to 2.0 million litres.
- A shunting neck at the Branxton end of the provisioning shed.

Stage 3 is proposed to have a 12 month construction duration commencing September 2017, allowing operation in September 2018. At the end of Stage 2 it is proposed that the following additional facilities would be present on site:-

- Locomotive maintenance facility.
- Wheel lathe facility.

PLANNING FRAMEWORK

The Project is being undertaken pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979*. As discussed above, it is a permissible land use within the 1(a) Rural “A” zone pursuant to the *Cessnock Local Environmental Plan 1989*.

An Environmental Protection and Biodiversity Conservation Act 1999 referral has been made to the Department of Environment, Water, Heritage and the Arts. The delegate for the Minister of Environment Protection, Heritage and the Arts decided that the proposal is a controlled action, as it is likely to have a significant impact on Threatened Species and Ecological Communities protected under the EPBC Act, in particular for the Grey-headed Flying-Fox, and the Regent Honey Eater. The Project is compliant with the relevant state and local environmental planning instruments.

Further, the Project is consistent with the Lower Hunter Regional Strategy and the Cessnock Citywide Settlement Strategy. In particular, it meets the objectives in both strategies for the provision of special purpose employment land.

CONSULTATION

Consultation with key stakeholders and government agencies has been undertaken during the concept design phase of the Project to minimise the potential impacts of the Project. A Planning Focus Meeting (PFM) was held in Newcastle for the Project and was attended by representatives from Australian Rail Track Corporation; Department of Environment, Climate Change and Water; Cessnock City Council; and Mine Subsidence Board. In addition to the PFM, Consultation has been undertaken with all tiers of government including: Department of Environment, Climate Change and Water (including the Office of Water); Department of Industry and Investment; Cessnock City Council; NSW Rural Fire Service; and Mines Subsidence Board. Consultation was also undertaken with the relevant service and infrastructure providers including the Roads and Traffic Authority; Hunter Water Corporation; Energy Australia; Newcastle Port Corporation; Australian Rail Track Corporation; and RailCorp.

Consultation was also undertaken with specialist interest groups including Aboriginal stakeholders. An initial Aboriginal Focus Group (AFG) meeting was held on 20 October 2009 and a second AFG meeting was held on 22 December 2009. These meetings were held to provide an introduction of the site and the Project to registered stakeholders. A number of issues were raised at these two focus group meetings. As a result of these issues, the preliminary design was amended to avoid, where possible, areas of potential archaeological deposits. Aboriginal stakeholders were involved in fieldwork and were provided opportunities to comment throughout the design phase.

In addition to consultation with government authorities, service and infrastructure providers and specialist interest groups, consultation was undertaken with the public and near neighbours. A Community Information Session (CIS) for the Project was held on 20 February 2010 at Greta. There were approximately 100 attendees at the CIS. The major benefits identified by local people were employment and the provision of local infrastructure and services. This is discussed in Section 14 of this report. The major concerns identified by local people were noise and traffic congestion. These issues are discussed in Section 9 and Section 8 of this report.

Through conversations held on the day with local people, it was clear that residents were often identifying cumulative impacts and had existing noise issues with trains on the rail lines and concerns about the development of a third track. This is discussed in Section 9 of this report.

In addition to the CIS, a Stakeholder and Community Liaison Plan (SCLP) was developed and implemented for the Project. As part of the SCLP, consultation was undertaken with near neighbours, the main issues raised included noise and visual impact. These are discussed in Sections 9 and 15 respectively. The SCLP would continue to be monitored and maintained throughout construction of the Project.

Additionally, a Project Hotline would be established as a mechanism to monitor and record any Project complaints. Ongoing consultation with near neighbours and the community would continue to occur throughout the Project.

KEY ENVIRONMENTAL ISSUES

The Preliminary Environmental Assessment and an Environmental Risk Analysis undertaken for the Project, as well as the Director-General Requirements issued by the NSW Department of Planning, have identified a number of key environmental issues for the Project as detailed below:-

- Ecology
- Traffic and Access
- Noise and Vibration
- Hazards and Risks
- Heritage
- Soils and Contamination
- Air Quality
- Social and Economic
- Visual

Other environmental issues have also been assessed in this report including Land Use; Waste Management; Flooding and Hydrology; and Drainage and Water Quality as well as Climate Change and Sustainability.

A summary of these issues is provided below:-

Ecology

The majority of the study area supports remnant vegetation in a near natural condition, with the exception of some introduced flora.

Some disturbances are evident and associated with previous land uses. Identified Endangered Ecological Communities (EECs) on site include 17.5ha of Lower Hunter Spotted Gum – Ironbark Forest, 21.4ha of Hunter Lowlands Red Gum Forest and 1.0ha of regenerating Hunter Lowlands Red Gum Forest. The condition of the EECs on site ranges from moderate to high providing habitat for a diversity of native flora and fauna species including rare and threatened species.

The Project would involve the clearance of 18.5ha of vegetation and disturbance to flora and fauna habitat, including threatened species and EECs.

If not properly managed, the loss of vegetation and fauna habitat may negatively affect several populations of threatened fauna species through the direct loss of known habitat, increasing the fragmentation of habitat and creating barriers to movement and dispersal of individuals. An assessment of significance of impacts was conducted for known and potential subject species (i.e. listed threatened species) in accordance with the *Draft Guidelines for Threatened Species Assessment* (DECC and DPI 2005) and in the National context in accordance with the *Significant Impact Guidelines for Matters of National Environmental Significance* (DEWHA 2006).

The assessment concluded that the Project is unlikely to impose a ‘significant impact’ on local populations of threatened species, endangered communities or their habitats as listed under the TSC Act and EPBC Act, on the basis that the site will become isolated between the railway and the Hunter Expressway and that these actions will reduce the connectivity, size and value of the habitats on site. It is recognised that the Project will contribute to the cumulative loss of habitat in the locality through the clearing of 18.5ha of vegetation. Therefore, it is considered appropriate to offset the impacts of the Project through seeking compensatory habitat of similar condition and size. Additional mitigation measures, including management practices such as the preparation of an ecological restoration plan, are proposed to mitigate the potential impact of the Project on flora and fauna. The Project has been designed to minimise the impact on flora and fauna with approximately 40% of the site area being directly impacted.

Traffic and Access

Access to the site is via Mansfield Street, Greta. Traffic travelling to the site can approach Mansfield Street from two directions. The most likely direction is from the north from Nelson Street via the New England Highway. This currently involves the crossing of a small wooden bridge across Anvil Creek and an existing poorly aligned rail overbridge. It is understood that ARTC are proposing to upgrade the existing rail bridge as part of their third track. The New England Highway carries the majority of traffic through the Hunter Valley and provides a connection from Greta onwards to Newcastle via Maitland to the east and Singleton to the west. There is also the ability to access the site from the south via Camp Road, which connects Cessnock and Kurri Kurri.

Traffic survey results were obtained which demonstrate that Nelson Street is currently operating well within its technical and functional capacity levels. It is carrying low traffic flows and there is plenty of spare capacity in this road for additional traffic. The New England Highway is operating at a poor level of service which results in delays and congestion for road users. This is consistent with observations on site, which showed that traffic is heavy through Greta for the peak direction of flows with a near constant line of traffic. There are limited opportunities for public transport and bicycle use within the locality with infrequent services and cycle ways and footpaths which are limited and inconsistent in their built form.

The primary impact to surrounding transport network infrastructure as a result of the Project would be during the construction phase.

The most significant impact is expected to be upon the intersection of the New England Highway and Nelson Street. On average, over a 12 month time frame, there would be an average of 50 workers on site in this time. However this would fluctuate with less workers on site in the early stages during bulk earthworks and increasing towards the end during building construction. However, it is important to note that these impacts are short term only.

A number of mitigation measures have been put forward to reduce these impacts, including the preparation of a Construction Traffic Management Plan. This would include implementing construction hours on site that finish at 6:00pm to reduce the stress on the Nelson Street/New England Highway during the peak PM period, as well as measures to restrict the right turn movement from Nelson Street onto the New England Highway during the PM peak period. These measures would be discussed with the RTA during the detailed design phase. This is especially relevant to the potential cumulative impact that would arise in the event that the Project is constructed at the same time as the Hunter Expressway. It is important to note that these construction impacts are short term only.

The analysis found that operational traffic flows associated with the development would have a minimal overall impact upon the operation of the intersection of the New England Highway and Nelson Street. The overall operation of the New England Highway in this location would remain as per existing conditions. Traffic generation is not expected to be significant with approximately 38 people employed at the final Stage 3. Traffic movements are staggered to coincide with shift times and occur over a 24 hour period. Additionally, some heavy vehicles would access the site, on average 5-7 per day for Stage 1, 7-9 per day for Stage 2 and 9-11 per day for Stage 3.

For Stage 1 of the Project, and prior to the commission of the Hunter Expressway, there could be increased delays and queues for traffic turning right out of Nelson Street during the afternoon peak period, however, these are not expected to be significant. Traffic data from the RTA shows that future traffic flows on this section of the New England Highway would reduce following the commission of the Hunter Expressway.

Thus, the future demand of the Project from Stages 2 and 3 would be acceptable on the Nelson Street and New England Highway intersection. To mitigate the short term impacts associated with Stage 1 (i.e. until the Hunter Expressway is commissioned) a Traffic Management Plan (TMP) should be prepared for Project operations which contains measures to discourage and reduce the number of vehicles exposed to the Nelson Street and New England Highway intersection during the peak PM period. Following implementation of this TMP it is considered that there would be no significant residual impacts associated with the operations of the Project.

Noise and Vibration

Noise

Long term background monitoring data was supplemented with operator attended noise monitoring to characterise the existing noise environment at six locations adjacent to the proposed TSF.

These receiving environments were considered representative of a mix of rural, suburban and urban receiver types, depending on the level of influence of existing transportation and environmental noise sources.

Existing transportation noise associated with the Main Northern Railway and the New England Highway was audible in all receiving environments, and found to present the dominant contribution to ambient noise levels at receivers in Greta, Illalong, Branxton and isolated residences on the New England Highway.

Existing noise levels from transportation sources during the night period were found to exceed the acceptable LAeq, period noise levels for the identified receiver types provided in the NSW Industrial Noise Policy. Accordingly, the Project Specific Noise Levels (PSNL) for all but one receiving environment was established in terms of the intrusiveness criteria.

Noise impact modelling was undertaken using the Environmental Noise Model (ENM) and Sound Power Level (SWL) data obtained from measurements at existing Pacific National operations. Review of prevailing meteorological conditions was also undertaken such that environmental propagation influences could be appropriately assessed.

Assessment of the impact modelling results indicates the proposed Project operations will comply with the relevant criteria under worst case meteorological conditions at receivers in the North Rothbury and Branxton receiving environments. Minor exceedences may be observed under worst case meteorological conditions at some receivers in the Tuckers Lane, Greta and New England Highway receiving environments. Impacts are likely to exceed the intrusiveness criteria at these locations, however, are compliant with the amenity criteria.

Review of these predictions against ambient noise impacts indicates the impact is minor and likely to be masked by existing transportation sources.

Impacts above the PSNL are also expected at receivers on Mansfield Street, Illalong located directly adjacent to the proposed site access. Assessment of modelling outputs indicates these impacts can be ameliorated by the construction of a noise barrier adjacent to the site entrance.

Impact predictions for the Project were also reviewed against potential impacts associated with the construction of the Hunter Expressway and expansion of the Main Northern Railway to include a third line. The results of this assessment indicate that impacts associated with these cumulative changes to the noise environment may lead to exceedence of the amenity criteria in some receiving environments.

Analysis of the contribution from TSF operations indicates noise levels generated by the Project will be significantly lower than those generated by the Hunter Expressway and Third Rail projects, and will effectively make no contribution to the cumulative noise impacts in receiving environments around Greta, Illalong and Branxton.

Vibration

The results of background vibration monitoring indicate estimated vibration dose values associated with the passage of trains on the Main Northern Railway are in the order of 0.02 to 0.05 ms-1.75. The maximum peak particle velocity result associated with a train pass-by event was 0.5 mm/s. These results were used to calibrate the vibration impact prediction curve for locomotive powered freight and passenger rail impacts provided by the US Federal Transit Authority. Additional corrections were applied to this curve to account for lower speeds and special track work encountered as trains enter the TSF. The results of this model that receivers 150 metres to the south of the arrival track may experience eVDV on the order of 0.03 ms-1.75, well below the 0.13 ms-1.75 criteria for the night period.

The assessed blast impact results indicate that, based on the observed separation distances, ground vibration levels are unlikely to exceed human annoyance or structural damage criteria at sensitive receivers adjacent to the blast site. Ground vibration levels may exceed the structural damage criterion established in DIN 4150-3: 1999. To address this matter, it is proposed to undertake consultation with ARTC to determine an acceptable impact criterion prior to commencement of construction works. It should be noted that the EA for ARTC's third track proposes to use blasting in the same area and as result this criteria should be able to be achieved.

These results indicate Project operations would comply with the criteria for both human comfort and annoyance and structural damage to buildings. Due to the transient nature of the impact and the difficulty in evaluating a vibration dose for an activity that may vary significantly with time, assessment of potential construction vibration impacts focus on the structural damage criteria.

The assessment indicates that construction vibration impacts will comply with the structural damage criteria for all building types at separation distances exceeding 20 metres.

Although considered compliant with the structural damage criteria, construction vibration impacts may remain perceptible by members of the community near to construction works. A range of potential mitigation measures outlined in the Interim Construction Noise Guideline (DECC, 2009) may be applied to minimise vibration impacts and manage the response where impacts are perceptible by the community.

Hazards and Risks

An assessment of the hazards and risks, including on the site as well as those associated with the Project, was undertaken. The identified hazards on site include: storage of dangerous goods, bushfire hazard and mine subsidence.

Dangerous Goods

The Project would store a variety of hazardous substances including: Diesel; Oil; Coolant; Detergent; Engine degreaser; LPG; and Paint. A preliminary risk screening of the proposed development is required under *State Environmental Planning Policy 33 – Hazardous and Offensive Development* to determine the need for a Preliminary Hazardous Assessment.

The proposed paint storage on site is well below the screening threshold for Class 3 substances of 2m³ and is therefore not considered potentially hazardous.

Similarly, the LPG is also well below the screening threshold for LPG of 16m³ and therefore is also classified as not potentially hazardous. Diesel and oils are classified as combustible C1 and C2 respectively and are only classified as dangerous goods Class 3 substances if they are stored with Class 3 substances. Due to the size of the site and the relatively small volume of paint to be stored, careful planning of the paint storage would be considered so that there is sufficient distance from the paint to the diesel and oil storage.

Paint would be delivered independently of diesel and therefore, it is only the paint and LPG that require inclusion in the transport screening. The amounts of paint and LPG that would be delivered for the Project are well below the quantity and annual movement thresholds for each relevant dangerous goods class and therefore, the development is not classified as potentially hazardous with respect to the transport of dangerous goods.

The preliminary risk screening and the transport screening indicate that the development is not classified as potentially hazardous and therefore would not require the preparation of a PHA. The development is therefore considered suitable with respect to the surrounding land users and will pose minimal risk to its neighbours.

Bushfire Hazard

An assessment of bushfire hazard found that the retained forest vegetation on the site and the forest vegetation in the proposed Hunter Expressway corridor, both prior to and after construction of the Hunter Expressway, would pose a hazard to the occupants of the Project as well as fixed and moveable assets.

The Bushfire Protection Assessment report found that in order to reduce the bushfire hazard on the Project, defensible spaces (Asset Protection Zones) are required to be provided and maintained so as to reduce the potential for flame contact on the structures.

Furthermore, management plans have been recommended so that the emergency evacuation is managed.

Management of the fixed and moveable assets can be established during bushfire events and the retained vegetation is fuel managed in order to reduce the bushfire hazard to the facility and to provide a safe access/egress route to/from Mansfield Street.

Mine Subsidence

Mine subsidence could potentially impact on both natural and constructed surface and sub-surface features on the site, including buildings, if not managed properly. Although the Greta Coal Measures consists of four seams, the site is underlain by shallow workings in the Greta Seam which is known to consist of two splits in the vicinity of Greta. The mine workings are known to be impacted by fire in the past. The depth of cover to mine workings ranges from about 10 metres in the southern portion of the site, to about 200 metres in the north-west corner of the site. There is an ongoing risk of pothole subsidence in the southern portion of the site for areas with less than about 30 metres cover.

Earlier geotechnical reports identify that there are depressions on site which may have been 'shafts' or 'subsidence troughs'. It is apparent from further investigation that these features are neither shafts, adits or mine subsidence features, but rather are shallow excavations dug for an undetermined purpose. The only geotechnical constrain on development is that these features contain uncontrolled and sometimes soft, wet filling. Where these features are present beneath structures, roads or railway tracks the infilled material should be over excavated to the base of the prior excavation and backfilled with engineered filling.

Pothole subsidence occurred in the southern portion of the site in February 2009. A conservative value of 40 metres cover was been adopted as the limit of pothole risk on this site. All buildings and workshops on site have been sited to the north west of the 40 metres isopach. Parts of the access road servicing the site, as well as the rail embankment are located on land with less than 40 metres of cover.

In the areas of the site with less than 40 metres cover, the development would be restricted to the proposed access road and rail spur. The mine workings below the footprint of the road and rail embankment would be fully grouted.

This information would be produced to the Mine Subsidence Board (MSB) for review. Any mitigation measures resulting from these final investigations and discussions with the MSB would be incorporated into the detailed design for the Project.

Heritage

Indigenous Heritage

The study area was traditionally occupied by the *Wonnarua* (also spelt Wanaruah), who occupied the lands from just above Maitland South to Wollombi and west through to the Dividing Range.

A field survey was undertaken which located 151 flaked stone artefacts as well as two Potential Archaeological Deposits (PADs). 130 artefacts were located within or around the area of PAD 1 and 21 artefacts were located in PAD 2. All artefacts were found in areas of higher ground surface visibility, and mostly in areas that had been eroded or disturbed, so are likely to have originated from a near surface or sub-surface context.

Within the Sawyers Creek Artefact Scatter 1 (PAD 1) the majority of the site would not be impacted by the Project, and the areas that would be impacted have suffered degradation from prior land use and erosion. The more intact parts of this site have been avoided by design changes during concept design phase. Some mitigation measures are proposed to minimise potential impact.

Within the Sawyers Creek Artefact Scatter 2 (PAD 2) significant proportions of this site have avoided being impacted by the Project as a result of design changes, including the movement of buildings and rail track realignment. One area of intact dense deposit and two other areas of disturbed, dense deposit will be impacted by the access road and one section of rail track. Some mitigation measures are proposed to minimise potential impact.

Discussions with Aboriginal stakeholders has revealed a strong attachment to the area and identified that nearly all archaeological sites are highly significant as reminders of the Aboriginal presence and connection to the land.

The potential impacts of the Project on Indigenous heritage have been considered at the early stages of the Project, including during development of the concept design for the Project. A number of changes were made to the site layout and design during the concept design phase to minimise the potential to impact of the Project on Indigenous heritage.

These changes included realignment of the access track servicing the site and relocation of some buildings on site outside of the PAD areas. These design changes, coupled with the mitigation measures contained above, reduce the potential for the Project to impact on Indigenous heritage. After implementation of the mitigation measures discussed above, it is concluded that the risk of residual impacts to Indigenous and non-Indigenous heritage from the Project would be very low.

Non-Indigenous Heritage

Site inspections, sub-surface testing and feature excavations were undertaken as part of the Project investigations. The majority of artefacts recovered included ceramics, glass and metal from domestic, architectural and agricultural classes. A small bronze cow bell and a bronze or brass belt buckle represent the most intact artefacts located. Numerous unfrosted bricks and other building materials were also located on site.

In relation to items in the local area which have been listed as having heritage significance, none are located on the subject land. However, the following items are located in the vicinity of the site.

The Greta Railway Station Group (SHR 01156), is located adjacent to, but not within the project area. The Greta Railway Station located on the Main North Line was first opened with the name of Farthing in 1869 and renamed Greta in 1878. The Greta Railway Station Group represents historic themes consistent with the development of Greta and surrounds and the rail and mining industries in the Hunter region. The Greta Railway Station Precinct is also listed on the NSW National Trust's Historic Items Conservation Register.

Within 1km of the area of proposed works the Hunter REP 1989 lists three items of regional environmental heritage (Schedule 2), three items of local environmental heritage (Schedule 3) and 10 items requiring further investigation (Schedule 4). All of these items are summarised in Table 46. Of the 10 sites requiring further investigation, four sites are located in or adjacent to the project area, being:-

- Whitburn Colliery
- Water Storage Tanks
- Anvil Creek Colliery
- Street of "Miners Cottages"

The Draft Cessnock LEP, lists the collieries of the South Maitland Coal Field/Greta Coal Measures Group as an item of local significance. Of this group, the Old Anvil Creek Colliery is adjacent to and situated outside the site beyond the rail corridor boundary to the east.

Part of the Great Northern Railway Network forms the eastern boundary of the study area and is listed as having State significance however, this item is not listed on the State Heritage Register.

At the request of the DOP Heritage Branch, additional field work was undertaken to determine if there was any evidence of the row of miner's cottages as shown on a 1873 map. There was material evidence for domestic occupation in the eastern part of the project area where the row of miner's cottages was mapped. It would appear that miners lived in two of the huts identified and there is some evidence to suggest they may have been of German origin. The majority of artefacts found in site point to the discard of domestic rubbish. It was found that artefacts, mainly non-diagnostic ceramic and glass, are scattered thinly across the landscape. Some aggregations indicate disposal areas while specific scatters are associated with building residues: a fireplace footing was found identified as MH11-E and a stone door sill and brick apron at MH5-E in the addendum to Appendix J. The condition of these building residues was 'Substantially Intact' (for what they represented) and their integrity was assessed as 'Minor Modification'.

Evidence from the analysis of artefacts from sub-surface testing and the excavation of features, indicates historical activity linked to the discard of domestic items within the activity area and provides a time frame of the mid to late 1800s for the deposition of the artefacts and the formation of the five sample features with artefacts excavated. Any significance associated with these finds is due to their uniqueness to the locality, however, they have been rated as low significance. As such, it is concluded that construction of the Project is not likely to result in significant impacts to non-Indigenous heritage sites.

Soils and Contamination

The following details a description of the existing environment on site in relation to soils and geology, contamination, methane gas and acid sulphate soils.

Soils and Geology

The 1:100,000 scale Newcastle Regional Coalfields Geology Sheet indicates that the site is in the area of outcrop of the Greta Coal Measures and the overlying Branxton Formation which is the basal member of the Maitland Group. The Greta Coal Measures typically comprises sandstone; conglomerate; siltstone; and coal, while the Branxton Formation typically comprises conglomerate; sandstone; and siltstone. The underlying geology of the study region comprises Permian sandstones; shales; mudstones; siltstones; tuffs; conglomerates; limestone and coal seams of the Singleton Coal Measures; Rutherford Formation; Farley Formation; Branxton Formation; Mulbring Siltstone; and Muree Sandstone.

The land-systems that cover the study area are the Branxton (Yellow Podsollic Soils) unit which is characterised by gently undulating and dissected by waterways, including Sawyers Creek, with some erosion problems in areas cleared of vegetation in the southern section of the site and the Rothbury (Red Podsollic Soils) unit in the northern two third of the site which is hillier, with slope gradients slightly higher than the Branxton unit Soils.

Both Rothbury and Branxton land-systems are similar, comprising brown loams, loamy sands and sandy loams, underlain by a distinct change to yellow to bright brown strong structured medium clays, which are sometimes mottled yellow and/or grey.

The Project would have the potential to impact on soils and geology if not managed properly. Bulk earthworks and construction of the Project may impact on soil stability and erosion within the locality. Construction plant, machinery and vehicles driving off road may also disturb surface soils.

The main impacts of the Project on soils and geology relate to cut and fill required to allow construction of the rail tracks at a suitable grade to the main line, as well as buildings on the site. This would require the removal of some rock. Approximately 50,688m³ of excess cut material would result from site earthworks. No excess cut would be removed from site. All excess cut would be disposed of onsite, through the construction of the landscaped acoustic mound or spread in the cleared areas as part of the revegetation strategy for the Project.

Contamination

The potential for contamination at the site is considered to be low. The principal sources of potential contamination are considered to be:-

- The presence of dumped rubbish and filling at various locations across the site.
- The possible previous use of the site for grazing cattle or potentially as a dairy farm.
- Localised oil spill observed within the cleared portion of the site which may be a source of elevated hydrocarbons in near-surface soils.
- The adjacent Main Northern Railway.

The identified potential contaminants are considered minor and are unlikely to result in adverse environmental impact. No remedial action plan would be required.

Methane Gas

The presence of methane is common in coal seams and underground coal mine workings, with methane a by-product of the coal-forming process. The presence of methane within former underground workings at the site cannot be discounted. The results of surface gas monitoring indicate that there was no detectable methane gas as the locality of the above surface features during the assessment.

There is a medium-high likelihood that methane could be exposed on site through excavation into shallow mine workings; a medium likelihood that methane could be exposed on site through mine subsidence potholing; a low-medium likelihood that methane could be exposed on site through uncapped shafts/drifts into the mine workings or methane/groundwater displacement; and a low likelihood that methane could be exposed on site through boreholes drilled into mine workings from the surface. All buildings will be sited on the surface with mine workings greater than 40 metres. This would reduce the need for mine grouting works or to excavate shallow workings for remediation. However, some remediation works would be required to construct the access road and rail tracks in the southern section of the site where located on top of workings less than 40 metres in depth. It is considered that the potential for encountering methane gas on site is low to medium. However, further monitoring would be undertaken during construction.

Acid Sulphate Soils

Coastal low-lying alluvial soils, generally lying below RL 5, but occasionally up to RL 10, AHD can contain pyrite or other sulphides.

In such situations where the sulphides are kept out of contact with air, they are relatively stable and generally in 'equilibrium with the local environment. If sulphides come into contact with air, they have the potential to oxidise and form sulphuric acid.

The site elevation is generally 50 to 70 AHD. Site soils are therefore not considered to be acid sulphate soils. This is reinforced by the site geology which generally comprises sandstone; conglomerate; siltstone; and coal of the Greta Coal Measures and Branxton Formation. This geology is not associated with ASS.

Additionally, reference to the Acid Sulphate Soil Risk Map (Second Edition) for Greta prepared by the NSW Department of Land and Water Conservation indicates that there is no known occurrence of acid sulphate soil materials at the site. It is not considered that Acid Sulphate Soils are likely to occur on site.

Air Quality

During construction of the Project some short term exceedences of dust emissions from the site are likely at surrounding residential receivers.

This is likely during the bulk earthworks phase which is expected to last approximately three months only. This could be attributed to existing high levels of dust particles within the atmosphere. In order to mitigate dust emissions from the site during the construction period, some mitigation measures would be implemented. These mitigation measures would allow a reduction in dust generated from the site. Dust impacts resulting from construction are likely to be short term only, and transient as construction moves around the site. As such, it is not expected that residual impacts would be significant.

Stage 3 operations represent the peak of operational capacity for the Project and as such it is assumed that compliance with air quality guidelines at this stage would result in compliance for less intensive operational Stages 1 and 2. During the Stage 3 operation of Project, all air and odour emissions from the site would achieve the relevant impact assessment criteria and consequently not result in any adverse impacts on surrounding sensitive receivers. As such, no mitigation measures are required, and no residual impacts are expected.

Social and Economic

According to the Lower Hunter Regional Strategy, 14% of Australian exports are derived from the Hunter and 95% of exports from Newcastle Port are coal. The coal chain in Newcastle is expected to expand in the next five years, potentially doubling the current level of export. Pacific National need to ensure they can meet this expected increase in demand. The Project would therefore provide National and State economic gains by ensuring that coal export expansions can continue to increase.

Greta is identified as a working class area with slightly higher unemployment than the State average, and a population which has skills that are ideally suited to the construction and operation of the Project.

The dominant industries of employment for Greta residents and the current profile of the Greta workers, suggests that the Project would be well situated and will employ the workers that already possess the skills required to; firstly construct and secondly operate the support facilities. The benefits to the community of providing local employment are significant and the predominant social impact will be the amenity issues.

An estimate of jobs created as a result of the construction and operation of the Project was undertaken based on a capital cost of \$110 million of the Project. The assessment found the following jobs were likely to be created as a result of the injection of funds into the local economy.

- Equivalent to at least 615 job years directly in construction related activities.

- Based on National benchmarks, a construction cost of \$110 million will generate a further \$99 million of activity and production induced effects and \$106 million in consumption induced effects.
- Total economic activity generated by the construction proposed development is at least \$315 million.
- During construction, the development as a whole will generate at least 2,527 job years in the economy through both direct and multiplier impacts (this is made up of a combination of 615 job years through direct construction and 1,913 through both production induced effects and consumption induced effects).
- Provide around 38 full time and part time jobs on site post construction.
- Contribute at least \$8.7 million per annum to NSW Gross Domestic Product bought about by workers involved in the operation of the Project.

Visual

The surrounding area is a mix of land uses with rural holdings; vineyards; established and new residential areas; mining; and large areas of existing bushland. The area is experiencing continued development, primarily with the expansion of existing residential areas on former rural land as well as the proposed extension to the F3 Freeway immediately west of the study area.

The broader landscape within the locality is characterised by a mosaic of open agricultural land with patches of forest and woodland including riparian vegetation and residential allotments.

The majority of the site has extensive tree coverage with a large area of cleared land occurring towards its southern end. Sawyers Creek and associated vegetation traverses the site towards its southern end.

A viewpoint analysis was undertaken at 15 locations within the locality. Of these 15 locations only two were considered to have a potential impact. Based on this it can be concluded that views of the site from surrounding locations are limited. The greatest visual impact is likely to be from residential areas on elevated land towards the southern parts of Greta.

The study area is also visible from elevated sections of the New England Highway mid way between Branxton and Greta. The Project would also result in a visual impact on train passengers and viewers in close proximity to Greta Railway Station, including adjoining residential properties located towards the southern extent of the site.

The Project would result in some impacts on the existing surrounding environment in terms of landscape and scenic values, especially from the viewpoints identified above. The visual impacts would vary depending on the viewing location. Any visual impact would result from the removal of existing vegetation and construction of buildings and associated rail infrastructure.

It is unlikely that the Project would result in a significant visual impact due to both the distance of the Project to the view points, as well as the change in site levels. Where buildings and infrastructure may be visible, landscaping and materials treatment would help soften any potential visual impact. A landscape master plan has been prepared for the Project which details proposed revegetation areas on the site as well as the landscaping treatment for the proposed access road and buildings on site.

Lighting of the Project also has the potential to have a visual impact on surrounding residences through lighting glare if not properly designed and managed. A preliminary lighting assessment undertaken for the Project has demonstrated that a Lighting design can be provided on site that meets AS4282: Control of Obtrusive effects of Outdoor Lighting, a management plan has been proposed. The design proposed will minimise energy consumption; has minimised light spill into both residential and bushland areas; reduced glare; and provided maintenance and monitoring recommendations to ensure that this can be managed in the long term.

The visual impact of the Project is not expected to be significant.

Land Use

The Project would result in a land use change for the site from vacant land to infrastructure. This would result in a physical change to the current site activities. The land use changes would generally be limited to the site only, no property acquisition would occur as a result of the Project. The only works outside the property boundary would be connection to the Main Northern Railway.

ARTC are still finalising the property boundary for their proposed third track, and as such, this environmental assessment covers the portion of land likely to be subject to acquisition.

The locality is likely to undergo significant change and intensification of land use following completion of the proposed third track on the Main Northern Railway and the Hunter Expressway. In the context of these two infrastructure Projects, the proposed land use change on the site is considered minor.

There would be no changes to existing land use or access arrangements to either adjoining or other properties in the locality as a result of the Project. The adjoining properties to the south would continue to gain access off Mansfield Street.

The implementation of the mitigation measures discussed throughout this report would allow the land use change on site to be managed in accordance with the relevant requirements, and with minimal impact.

Overall, land use impacts as a result of the Project are not considered to be significant, and no specific mitigation measures would be required.

Waste Management

Waste would be generated as a result of the Project both during construction and operation. Likely construction waste streams include: excavated material from bulk earthworks, including soils and some rock, Vegetation from clearing activities, excess construction materials, liquid wastes from plant and machinery maintenance, wastewater from dust suppression activities, sewage and general rubbish and recyclables. Some waste would be generated as a result of operations, although this is expected to be minimal. Based on the current Pacific National operations at Port Waratah and Kooragang, the following waste streams are expected to be generated as a result of the Project: Liquid Waste (oily water containing diesel, oil, sludge etc), sand (from provisioning activities), general rubbish (skip bins), Recyclables (paper etc from office activities), scrap Metal/Steel, wagon maintenance waste and green waste,

Where possible waste generated on site would be reused on site, or recycled at an off site location. Once the facility is operational, Pacific National would be able to employ the waste management strategies they have developed in their current business to effectively and efficiently manage wastes such as oil and used parts. This would include the preparation of a Waste Management Plan for the Project which would detail the waste management strategies to be employed on site.

Flooding and Hydrology

Flood modelling was undertaken for the Project which determined that flooding was unlikely to be a significant issue on the site.

In extreme flood events, it is likely that evacuation planning is not considered to be a significant issue of the site, due to the site rising to the west, and the likelihood that if the site was evacuated, local roads in the Greta area would likely be inundated, and restrict the movement of people leaving the site. The elements of construction which are most likely to impact on the stormwater events in relation to flooding on the site are:-

- The construction of a third rail and how stormwater will be directed from Sawyers Creek under the main northern rail.
- The construction of an access road on the Pacific National site to span Sawyers Creek.

- The construction of the extension of the F3 Freeway on the western boundary of the site.

Each of the items discussed above will need to be considered once their design is better understood, and their impact can be assessed in relation to drainage and flooding on the site. A concept drainage plan has been prepared for the Project and submitted with the Project Application which considers these items. These items would also be considered during detailed design for the Project. The bridge to be constructed over Sawyers Creek would be designed and constructed to withstand the effects of flooding, and be above the 1 in 100 year flood event for the site.

Groundwater

Sub-surface investigation was undertaken by Douglas Partners who drilled four boreholes. The investigation discovered that groundwater was found between 10.4 metres and 23.5 metres below natural ground level, or between 42.4 to 43.7 AHD. A records search of registered groundwater wells indicated that the nearest registered well (GW080479) to the site is located approximately 500 metres west of the site's southern boundary. The next closest registered groundwater well (GW080478) is located approximately 800 metres to the south west of the site.

The Project has the potential to affect groundwater via migration of contamination from the following sources:-

- Fuel storage and associated fuel leaks, spillage.
- Chemical storage.
- Wastewater systems/management (e.g. sumps, oil water separators).
- Solid and liquid waste handling/storage.

The Project would be designed in accordance with the relevant environmental regulations which would ensure that sufficient safeguards are put in place to minimise the migration of contamination and consequently, potential to impact groundwater quality at the site.

Groundwater could also be impacted if mine rectification works are undertaken at the site. All buildings on site would be located over mine workings with greater than 40 metres cover. Mine rectification works would not be required for these structures however, mine rectification works would be required for parts of the access road and rail tracks in the southern portion of the site.

Where these works are undertaken, the injection of grout could cause displacement of groundwater and result in localised impacts on the groundwater flow regime.

The mine water would not be suitable for discharge to the existing creek system and would need to be disposed of or treated.

The groundwater data obtained suggests that regional groundwater is at considerable depth. In addition, the low permeability of the overlying strata will restrict migration of surface impacts to the underlying groundwater table.

The Project would be designed in accordance with the relevant environmental requirements, and the controls required by current regulations would allow early detection and cleanup of any spills/leaks. This would minimise the risk for adverse impact on groundwater quality. In addition, if groundwater was displaced during construction as a result of mine rectification works, it could be easily managed, as discussed below. Overall, the Project is considered to have a low potential for impact on groundwater at the site.

Drainage and Water Quality

The key potential water quality impacts as a result of the Project are:-

- Elevated concentrations of suspended sediment in surface run-off during the construction and operational stages of the development.
- Elevated concentrations of oils, greases and heavy metals in the surface run-off during the operational stage.
- The potential for an accidental spill to occur resulting in discharge of a polluting substance from the site.

A Surface Water Management Plan (SWMP) has been prepared, and would be implemented for the Project. The SWMP incorporates a range of preventative, treatment and contingency measures for the Project. Preventative measures are included as they are the most effective stormwater management methods to control the source of any surface water management issues.

These measures include: isolation of the clean water drainage; isolation of highly polluting areas; operational procedures; and stabilisation of exposed soils.

A rainwater harvesting scheme would also be implemented to supplement the on-site non-potable water requirements for both toilet flushing and locomotive washing.

All surface run-off from the Project would be treated in one of five Water Quality Control Ponds (WQCPs) on site prior to discharge.

WQCPs were selected as the preferred water quality treatment method as they are suited to flat sites and facilitate relative ease of maintenance.

The WQCPs are designed to achieve an 80% reduction in suspended sediment levels and remove low to moderate concentrations of heavy metals and oils and greases. A two stage treatment process incorporating an inlet pond and macrophyte zone would be implemented. Outlet control in the form of a grated outlet pit would also be construed to control outflow from the WQCP.

Trade waste generated from the locomotive wash facility and various workshops on site also has the potential to impact on water quality. Run-off from these facilities is expected to contain elevated levels of oils and greases; suspended solids; heavy metals; nutrients; and chemical oxygen demand. The collective volume of trade waste generated on-site would be approximately 4KL/day. Preventative and treatment measures would be implemented to maintain an acceptable trade waste quality.

Riparian corridors would be treated on site through the provision of a core riparian zone and a vegetated buffer. This approach is consistent with DECCW's *Guideline for Controlled Activities: Riparian Corridors*.

It is considered that with the adoption of the mitigation measures discussed in this report, the Project is unlikely to adversely impact the water quality in Anvil Creek and downstream receiving waters.

Climate Change and Sustainability

The Project would result in the generation of some greenhouse gases during the construction and operation phases. In particular, the use of machinery during the construction phase, and train movements during the operation phase would require fuel and therefore result in some greenhouse gas emissions. Additionally, activities on site such as lighting would require electricity and would result in some consumption. These emissions are considered minor in nature and unlikely to result in a significant impact. Where possible, works would be undertaken on site to minimise greenhouse gas emissions through both technological and environmental controls. All work on site would be undertaken in accordance with Pacific National's Greenhouse Gas Management policy which minimises fuel and energy consumption. The Project itself does not generate demand for additional train movements. The Project will service and provision trains currently owned by Pacific National and any additions to their fleet.

The concept design for the Project has been so that buildings and structures on site minimise their environmental impact. A sustainability consultant was employed during development of the concept design to undertake an assessment of sustainability opportunities for the Project. The sustainability recommendations would be further refined during the detailed design phase.

CONCLUSION

This Environmental Assessment has been prepared in accordance with the Director General's Requirements issued for the Project. The Project is being undertaken pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979*.

It is a permissible land use within the 1(a) Rural "A" zone pursuant to the *Cessnock Local Environmental Plan 1989*. The Project meets the requirements of the relevant legislation and does not raise any issues that conflict with any Commonwealth, State or local planning policies. The implementation of appropriate mitigation measures identified within this report would minimise any potential environmental impact of the Project. Overall, it is considered that the subject site is suitable for the Project and the Project would not result in any unreasonable impacts to the surrounding locality.

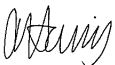
II. CERTIFICATION

ENVIRONMENTAL ASSESSMENT PREPARED BY:

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PROJECT:	Environmental Assessment for Pacific National Train Support Facility at Greta in the Cessnock City Council Local Government Area
CLIENT:	Pacific National
OUR REFERENCE:	08/198
REV / DATE:	Revision 4, 23 August 2010
AUTHOR:	Tegan Harris B. Dev St, B.A, G.D.U.R.P, CPP
CERTIFICATION:	I certify that this Environmental Assessment has been prepared in accordance with the requirements of Part 3A of the <i>Environmental Planning and Assessment Act 1979</i> and in accordance with the Director-General's Requirements issued for MP09-0233 on 12 October 2009 and the Supplementary Director-General's Requirements issued for MP09-0233 on 24 February 2010. I certify that to the best of my knowledge, the information contained in this assessment is neither false nor misleading.
SIGNATURE:	
CHECKED BY:	Stephen Barr B. Surv. MPlan. CPP, Registered Surveyor
SIGNATURE:	

1. INTRODUCTION

This report provides an Environmental Assessment for a proposed Train Support Facility (TSF) in Greta, New South Wales in accordance with the Director-General's Requirements (DGR's) issued for the Project on 12 October 2009 and the Supplementary Director-General's Requirements (Supplementary DGR's) issued for the Project on 24 February 2010. It details the strategic planning context for the Project, reviews the potential impacts from the Project and recommends mitigation measures to reduce any potential environmental impact. This chapter provides the introduction and background to the Environmental Assessment and includes a description of where each of the Director-General's Requirements is addressed in the report.

This Environmental Assessment Report comprises Volume 1 and Volume 2, which also contain the appendices, including the relevant specialist reports. The development plans for the Project are contained in Volume 3.

1.1 BACKGROUND

Pacific National provides rail transport of bulk and other commodities in all states and territories of Australia. Within New South Wales, these services are predominately located in the Hunter and Illawarra Regions, providing for the movement of coal and grain to the Ports. Pacific National currently transports more than 80% of the coal within the Hunter Valley and 100% of the coal transported by rail in the Illawarra Region. This represents a significant percentage of New South Wales exports.

The export of coal and coke from New South Wales in 2007/2008 was \$6.2 billion with the vast majority of this coal leaving via the Port of Newcastle. The export of coal through the Port of Newcastle is predicted to nearly double over the next five years. The Hunter Valley coal chain is responsible for the efficient delivery of coal to the Port. Pacific National is a critical link in the coal chain, providing bulk haulage of approximately 85% of all Hunter Valley coal. The current rail system is considered constrained and one of the system capacity enhancement strategies has identified a requirement for alternative fuelling/provisioning locations to meet the increase in traffic required. The Project would allow Pacific National to expand their services in the Hunter Valley and to meet an objective to free up coal chain capacity in operating from the existing provisioning facilities at the Port end of the rail system.

On 3 September 2008, Pacific National purchased 46.568 hectares of land at Greta between the existing railway and the planned Hunter Expressway (F3 Freeway extension).

Pacific National proposes to establish a TSF on the subject site. As discussed above, the TSF is required to service and provision trains for the Pacific National coal freight business.

1.2 LOCATION OF THE PROJECT

The site of the proposed facility is geographically located in the Hunter Valley in the Local Government Area of Cessnock near the Township of Greta. Greta is located approximately 50 kilometres north-west of Newcastle and 20 kilometres north of Cessnock. The subject site is located to the west of the existing township between the Main Northern Railway and the road corridor for the proposed Hunter Expressway. Further information regarding the location of the Project is contained in Section 2.2.

1.3 DIRECTOR GENERAL'S REQUIREMENTS

The Project will be assessed under Part 3A of the EP&A Act as a major Project and follow the Part 3A Project approval process. The NSW Department of Planning (DOP) formed the opinion under Clause 6 of the EP&A Act, in a letter dated 10 February 2009, that the Project is declared to be a Major Project under Part 3A of the EP&A Act. Following this declaration a Preliminary Environmental Assessment Report was prepared and assessed by the DOP. The Director-General of the DOP identified a number of key and general assessment requirements to be addressed in this Environmental Assessment within the DGR's issued for the Project on 12 October 2009. The following table details the DGR's including where they are addressed in the Environmental Assessment. Sections 7 - 15 of this report address the key environmental issues, including those identified in the DGR's and as a result of the Environmental Risk Analysis. Section 16 addresses other environmental issues associated with the Project.

Table 1 Director-General's Requirements and Where They are Addressed in the Environmental Assessment

	DIRECTOR-GENERAL REQUIREMENTS	SECTION ADDRESSED
	EXECUTIVE SUMMARY	
	A detailed description of the Project including:-	
	Location, site description, and planning context.	Sections 2.2 and 2.3 and Chapter 5
	Project components and design elements (including site layout and responses to site constraints).	Section 3.3

	DIRECTOR-GENERAL REQUIREMENTS	SECTION ADDRESSED
	Construction and operational characteristics.	Section 3.5 and 3.6
	Identification of Project and component staging and timing (if proposed).	Section 3.4
	Assessment of the key issues, with the following aspects addressed for each key issue (where relevant):- - Describe the existing environment. - Assess the potential impacts of the Project at both construction and Operation stages. Direct, indirect and cumulative impacts must be considered. - Identify how relevant planning, land use and development matters have been considered in the impact assessment and/or in developing management/mitigation measures. - Describe measures to be implemented to avoid, minimise, manage, mitigate, offset and/or monitor the impacts of the Project. - Any residual Impact.	Chapters 7-15
	A draft Statement of Commitments (SOC) incorporating or otherwise capturing measures to avoid, minimise, manage, mitigate, offset and/or monitor impacts identified in the impact assessment sections of the Environmental Assessment. The SOC must clearly articulate the desired environmental outcome of the commitment. The SOC must be achievable, measureable (with respect to compliance), and time-specific, where relevant.	Section 18.3
	Certification by the author of the Environmental Assessment that the information contained in the Assessment is neither false nor misleading.	Section ii.
	Strategic and Project Justification:-	
	Describe the strategic need, justification and objectives for the Project.	Sections 4.2, 4.5 and 4.3
	Identify alternatives to the preferred project considered.	Section 4.4
	Justify the project taking into consideration the objects of the <i>Environmental Planning and Assessment Act 1979</i>, and its consistency with the aims and objectives of relevant State Policies (<i>NSW State Plan, State Infrastructure Strategy and the Lower Hunter Regional Strategy</i>).	Section 4.5
	Project Objectives.	Section 4.3

	DIRECTOR-GENERAL REQUIREMENTS	SECTION ADDRESSED
Key Issues - Ecology	Ecology – including, but not limited to:-	Chapter 7 and Appendix A
	Threatened species, populations, endangered ecological communities and/or critical habitat.	Section 7.3 Section 3 and 4 in Appendix A
	Surveys of identified species and habitat including the Lower Hunter Spotted Gum Ironbark Forest.	Section 7.3 Section 3 and 4 in Appendix A
	Vegetation Clearing (foraging, roosting, nesting, habitat loss and fragmentation). Riparian impacts and operational impacts (such as lighting and noise).	Sections 7.4 and 16.5 Chapters 9 and 16.
	Surface and groundwater impacts and management.	Section 16.4
	Taking into account of the <i>Draft Guidelines for Threatened Species Assessment</i> (DEC and DPI, 2005) and <i>Principles for the Use of Biodiversity Off-sets in NSW</i> (DECCW, 2008).	Section 7.2. Section 2 in Appendix A.
Key Issues – Traffic and Access	Traffic and Access – including but not limited to:-	Chapter 8 and Appendix B
	Access to, from and within the site (for all modes and needs).	Section 8.2 and 8.3.1
	Interaction and integration with existing and planned transport infrastructure and services, including development of the Hunter Expressway and the <i>Hunter Valley (Rail) Corridor Capacity Strategy</i> (ARTC, 2009).	Section 8.3.8
	A Traffic Impact Assessment, including a traffic analysis on major/relevant intersections and consideration of existing road constraints, for example, bridges.	Appendix B
	Taking into account the <i>Guide to Traffic Generating Developments</i> (RTA, 2002).	Section 8.1.1
Key Issues – Noise and Vibration	Noise and Vibration – including but not limited to:-	Chapter 9, Appendices C and D
	Noise and vibration from all activities and sources on and off site and impacts to receivers.	Section 9.2

	DIRECTOR-GENERAL REQUIREMENTS	SECTION ADDRESSED
	The noise assessment must consider the impact from the project in isolation and in a cumulative context with relevant existing and approved development, including development of the Hunter Expressway and the third railway line between Maitland and Minimbah.	Section 9.3 including Section 9.3.2
	Taking into account the <i>NSW Industrial Noise Policy</i> (DECC, 2000), the <i>NSW Environmental Criteria for Road Traffic Noise</i> (EPA, 1999) and <i>Interim Construction Noise Guideline</i> (DECC, 2009).	Section 9.1.1 Appendix C
Key Issues – Hazards and Risks	Hazards and Risks – including but not limited to:-	Chapter 1 Appendices E, G and H
	Consideration of the hazards and risks associated with the use, storage and transportation of dangerous goods consistent with the Department's Guideline <i>Applying SEPP 33</i>, and if relevant, a <i>Preliminary Hazard Analysis</i> in accordance with the <i>Department's Hazardous Industry Planning Advisory Paper No. 6, Guidelines for Hazard Analysis</i>.	Sections 10.2.1 and 10.3.1 Appendix E
	Assessment of bushfire hazards, including the identification of access and egress from the site and evacuation routes.	Sections 10.2.2, 10.3.2, 10.4.3 Appendix H
	Potential risks and impacts associated with mine subsidence.	Sections 10.2.3, 10.3.3, 10.4.2 Appendix G
Key Issues - Heritage	Heritage – including but not limited to:-	Chapter 11 Appendices I and J
	Indigenous heritage items and places of significance, natural and landscape values of the site and surrounding area, taking into account the <i>Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation</i> (DEC, 2005).	Sections 11.1.1, 11.2.1, 11.3.1-4 and 11.4.1 Appendix I
	Non-Indigenous heritage, including archaeology items and areas of local, state and national heritage significance on the site and within the surrounding area.	Sections 11.2.2, 11.4.5 and 11.4.1 Appendix J

	DIRECTOR-GENERAL REQUIREMENTS	SECTION ADDRESSED
Key Issues – Soils and Contamination	Soils and Contamination – including but not limited to:-	Chapter 12 Appendix F and K
	1. Potential land contamination, and where remediation is required, presentation of a Remedial Action Plan.	Sections 12.2.2 and 12.3.2 Appendix K
	2. Natural soil constraints, including potential for methane gas and acid sulphate soils.	Sections 12.2.1, 12.2.3-4, 12.3.1, 12.3.3-4, 12.4.1 and 12.4.3-4 Appendix F
	3. Taking into account the <i>Managing Land Contamination Guidelines</i> (DUAP, 1998), <i>Guidelines for Consultants Reporting on Contaminated Sites</i> (EPA, 2007), <i>Guidelines for the NSW Site Auditor Scheme</i> (EPA, 1998) and <i>Sampling Design Guidelines</i> (EPA, 1995).	Section 12.1 Appendix K
Key Issues – Air Quality	Air Quality – including but not limited to:-	Chapter 13 Appendix L
	Air pollutants, including an assessment of atmospheric pollutants of concern for local air quality, from fugitive and point sources.	Section 13.2
	Potential odour from exhaust emissions.	Section 13.3.2 Section 3.2 of Appendix L
	Taking into account the <i>Approved Methods for the Modelling and Assessment of Air Pollutants in NSW</i> (DEC, 2005).	Section 13.1.1

	DIRECTOR-GENERAL REQUIREMENTS	SECTION ADDRESSED
Environmental Risk Analysis	Environmental Risk Analysis. Notwithstanding the above key assessment requires, the Environmental Assessment must include an environmental risk analysis to identify potential environmental impacts associated with the Project (construction and operation), proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified through this environmental risk analysis, an appropriately detailed impact assessment of this additional key environmental impact must be included in the Environmental Assessment.	Chapter 17 Additional key issues addressed in Chapters 14 and 15 Additional non-key issues addressed in Chapter 16
Consultation	Consultation. The Environmental Assessment must reflect an appropriate and justified level of consultation with relevant parties during the preparation of the Environmental Assessment, including:-	Chapter 6 Attachment 1 of Appendix N
	- Local, State or Commonwealth Government authorities including:- - Department of Environment, Climate Change and Water, including the Office of Water. - Department of Industry and Investment. - Cessnock City Council. - NSW Rural Fire Service. - Mine Subsidence Board.	Section 6.2
	- Service and Infrastructure Providers including:- - NSW Roads and Traffic Authority. - RailCorp. - Australian Rail Track Corporation. - Hunter Water.	Section 6.3
	Specialist interest groups including Aboriginal stakeholders; and	Section 6.4
	The public, including specialist interest groups and affected landowners.	Section 6.5

Supplementary DGR's for the Project were issued by the DOP on 24 February 2010, in response the Project being declared a Controlled Action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. As a consequence, the DOP on behalf of the Minister for Planning, has confirmed to the Commonwealth that an accredited assessment process will apply. As a result, Pacific National is required to undertake an environmental impact assessment of the Project to satisfy the requirements of both NSW and Commonwealth legislation. The Supplementary DGR's are detailed in the following table which also includes where they are addressed in the EA.

Table 2 Supplementary DGR'S and where they are addressed in the EA.

SUPPLEMENTARY DIRECTOR-GENERAL REQUIREMENTS		SECTION ADDRESSED
General Information	The background of the action, including:-	
	a) The title of the action.	Section 5.4
	b) The full name and postal address of the designated proponent.	See Project Application Form
	c) A clear outline of the objective of the action.	Section 4.3
	d) The location of the action.	Section 1.2 and 2.2
	e) The background to the development of the action.	Section 1.1
	f) How the action relates to any other actions (of which the proponent should reasonably be aware) that have been, or are being, taken or that have been approved in the region affected by the action.	See note 1 below
	g) The current status of the action.	Section 5.4
	h) The consequences of not proceeding with the action.	Section 4.4.2
Description of the Controlled Action	A description of the action, including:-	
	a) All the components of the action.	Section 3.3
	b) The location and area in hectares of any works to be undertaken, structures to be built or elements of the action that may have relevant impacts.	Table 10 in Section 7.4
	c) How the works are to be undertaken and design parameters for those aspects of the structures or elements of the action that may have relevant impacts.	Section 3.5

SUPPLEMENTARY DIRECTOR-GENERAL REQUIREMENTS		SECTION ADDRESSED
	d) The timing and duration of the works to be undertaken.	Section 3.4 and 3.5
	e) To the extent reasonably practicable, a description of any feasible alternatives to the controlled action that have been identified through the assessment, and their likely impact, including:- i. If relevant, the alternative of taking no action. ii. A comparative description of the impacts of each alternative on the matters protected by the controlled provisions for the action. iii. Sufficient detail to clarify why any alternative is preferred to another.	Section 4.4
Description of the Existing Environment	A description of the existing environment of the proposal location and the surrounding areas that may be affected by the action, including:-	
	a) Targeted surveys using accepted requirements for surveying listed threatened species, ecological communities and their respective habitat, including but not limited to DECC's <i>Survey and Assessment Guidelines (2009)</i> , available at:- http://www.environment.nsw.gov.au/threatenedspecies/surveymethodsfauna.htm	Section 7.3.2 Section 2 and 4 in Appendix A
	In addition to the requirements outlined in DECC's <i>Survey and Assessment Guidelines (2009)</i> , the following must be included:-	
	b) A description of the nature, location and extent of threatened species and ecological communities, as well as suitable habitat (including breeding, foraging, roosting, habitat, habitat critical to the survival of threatened species and migration paths) within the site and in surrounding areas that may be impacted by the proposal.	Section 7.3 Appendix A and B in Appendix A
	c) The regional distribution of suitable and potential habitat in the region surrounding the site.	Section 7.4.2 Appendix A and B in Appendix A

SUPPLEMENTARY DIRECTOR-GENERAL REQUIREMENTS		SECTION ADDRESSED
Description of the Relevant Impacts	A description of the relevant impacts of the controlled action:-	
	a) An assessment of all relevant impacts with reference to the <i>EPBC Act Policy Statement 1.1 Significant Impact Guidelines Matters of National Environmental Significant (2009)</i> at the controlled action has, will have or is likely to have on:- i. Threatened species and threatened ecological communities potentially present and listed under Sections 18 and 18A of the EPBC Act, including, but not limited to, the EPBC listed species outlined on the first page of these requirements. ii. The composition, extent and location of vegetation and suitable habitat on site and in adjacent areas potentially impacted.	Section 7.4.7 including Table 12 Appendix A in Appendix A
	b) Information must include:- i. A description and detailed assessment of the nature, location and extent of the likely short term and long term relevant impacts of the action, including direct, indirect, and cumulative impacts, for both the construction and operation phase of the project. ii. A statement whether any relevant impacts are likely to be unknown, unpredictable or irreversible. iii. Analysis of the scale of the relevant impacts. iv. Any technical data and other information used or needed to make a detailed assessment of the relevant impacts.	Section 7.4 Section 5 in Appendix A
Proposed Safeguards, Mitigation – Off-set Measures	A description of feasible mitigation measures, changes to the controlled action or procedures, which have been proposed by the proponent or suggested in public submissions, and which a particular focus on preventing or minimising relevant impacts on listed threatened species and ecological communities. Information must include:-	
	a) A description of the mitigation measures proposed to be undertaken to prevent, minimise or compensate for the relevant impacts of the action that are substantiated and based on best available practices.	Section 7.5 and 18.3 Section 6 in Appendix A

SUPPLEMENTARY DIRECTOR-GENERAL REQUIREMENTS		SECTION ADDRESSED
	b) An assessment of the expected or predicted effectiveness of, the mitigation measures, including the effect on extent and condition of species, suitable habitat, and ecological communities.	Section 7.5 and 18.3 Section 5 and 6 in Appendix A
	c) Any statutory or policy basis for the mitigation measures.	Section 18.3 Section 6.3 in Appendix A
	d) The cost of the mitigation measures.	See note 2
	e) An outline of an environmental management plan that sets out the framework for continuing management, mitigation and monitoring programs for the relevant impacts of the action including the person or agency responsible for implementing these programs and the effectiveness of all mitigation measures, including any provisions for independent environmental auditing.	Appendix E in Appendix A
	f) The name of the agency responsible for endorsing or approving each mitigation measure or monitoring program.	Section 18.3
	g) Identification of mitigation measures proposed to be undertaken by State Governments, Local Governments or the proponent.	Not Applicable. See Section 18.3. All mitigation measures to be undertaken by proponent
	h) Identification of potential off-sets to compensate for any predicted or potential impacts on threatened species and ecological communities which cannot be avoided or mitigated, such as the direct removal of suitable habitat. Reference should be made to the Department's Draft Policy Statement at: http://www.environment.gov.au/eobc/publications/draft-environmental-offsets.html	Section 5.2 including Section 5.2.3 Section 6.3 in Appendix A
	i) A qualitative assessment of the impact of the off-sets on other matters of environmental, economic, or social significance.	Section 5.2 including Section 5.2.3 Section 6.3 in Appendix A
	j) Analysis of cost, both financial and other, related to off-sets.	See note 2

SUPPLEMENTARY DIRECTOR-GENERAL REQUIREMENTS		SECTION ADDRESSED
Other Approvals and Conditions	Any other requirements for approval or conditions that apply, or that the proponent reasonably believes are likely to apply, to the proposed action. Information must include:-	
	a) Details of any local or State Government planning scheme, or plan or policy under any local or State Government planning system that deals with the proposed action, including:- i. What environmental assessment of the proposed action has been, or is being, carried out under the scheme, plan or policy. ii. How the scheme provides for the prevention, minimisation and management of any relevant impacts.	Section 5.2 – 5.7
	b) A description of any approval that has been obtained from a State, Territory or Commonwealth agency or authority (other than an approval under the Act), including any conditions that apply to the action.	Approval subject to this Application Section 5.3 Draft SOC in Section 18.3
	c) A statement identifying any additional approval that is required.	Section 5.3 and 5.5
	d) A description of the monitoring, enforcement and review procedures that apply, or are proposed to apply, to the action.	Section 18.3
Economic and Social	Economic and social matters	
	A description of long term and short term economic and social considerations regarding the project.	Chapter 14 Appendix M and N
Environmental Record	Environmental record of person proposing to take the action	
	a) Details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:- i. The proponent ii. For any action for which a person has applied for a permit, the person making the application.	See discussion on POEO Act in Section 5.5
	b) Details of the proponent's environmental policy and planning framework.	Section 18.1

SUPPLEMENTARY DIRECTOR-GENERAL REQUIREMENTS		SECTION ADDRESSED
Information sources	For information given in an environmental assessment, the draft must state:-	
	a) The source of the information.	Introduction in Chapters 7-16 Appendix A-Q
	b) How recent the information is.	Introduction in Chapters 7-16 Appendix A-Q
	c) How the reliability of the information was tested.	Introduction in Chapters 7-16 Appendix A-Q
	d) What uncertainties (if any) are in the information.	Introduction in Chapters 7-16 Appendix A-Q
Consultation	Consultation	
	a) Any consultation about the action, including:- i. Any consultation that has already taken place. ii. Proposed consultation about relevant impacts of the action. iii. If there has been consultation about the proposed action – any documented response to, or result of, the consultation.	Chapter 6 Attachment A in Appendix N
	b) Identification of affected parties, including a statement mentioning any communities that may be affected and describing their views.	Chapter 6 in particular, Sections 6.4 and 6.5 Attachment A in Appendix N

Notes:

1 – The proponent is not aware of any other controlled actions approved within the region. A number of actions are proposed adjacent to the site including ARTC's third track and the RTA's Hunter Expressway. The primarily cumulative impacts of these proposed developments and the Project relate to traffic and noise. This is addressed in Sections 8.3.8 and Section 9.3.2. An assessment of the cumulative loss of vegetation and vegetation connectivity has also been undertaken and is present in Section 7.4 and Appendix A.

2 – For the purposes of this Environmental Assessment offsets and other mitigation measures have not been costed as they are dependent on a number of factors including the location and zoning of the proposed offset and professional fees such as legal fees and survey fees. With regard to proposed offsets, there is also an element of commercial sensitivity which prohibits the disclosure of some costs.

Applicable DGR's are also listed in the introduction to each of the following sections of this report. As the supplementary DGR's issued for the Project replicate much of the information in the DGR's they have been included in this chapter only.

In addition to the DGR's issued for the Project, an Environmental Risk Analysis was also undertaken for the Project (refer to Section 17) which identified two more key issues to address, being Social and Economic Impact and Visual Impact, as well as a number of other environmental considerations. These have also been discussed in this report.

A comprehensive set of environmental mitigation measures would be implemented, which aim to minimise potential impacts during construction and operation of the Project. These mitigation measures would allow the Project to be carried out in accordance with all relevant environmental requirements. These measures are specified in the draft SOC contained in Section 18 of this report and would be contained within the Construction and Environmental Management Plan (CEMP) to be prepared for the Project.

2 **SITE DESCRIPTION**

2.1 **INTRODUCTION**

The DGR's issued for the Project require that a detailed site description be provided. The following chapter provides an overall description of the subject site including a locality description and a table which details how the subject site meets Pacific National's selection criteria. Additional specific information is contained within Sections 7 - 16 of this report containing detailed existing environment descriptions for each issue addressed within this report.

2.2 **LOCALITY DESCRIPTION**

The site of the proposed facility is geographically located in the Hunter Valley in the Local Government Area of Cessnock near the Township of Greta. Greta is located approximately 50 kilometres north-west of Newcastle and 20 kilometres north of Cessnock.

The site is located to the south of the existing township on the south western side of, and adjacent to the Great Northern Railway at Greta and adjacent to the route for the planned Hunter Expressway, being the extension of the F3 Freeway. The proposed development extends north-west from near Greta Railway Station for a distance of approximately 2.4 kilometres, and extends south west to the identified corridor for the planned Hunter Expressway.

The site is well located in terms of major transport routes and proximity to regional centres. The site is around 20 kilometres north of Cessnock, 22 kilometres north-west of Maitland and 24.5 kilometres south-east of Singleton. It is easily accessible from the north and east from the New England Highway via Nelson Street and Mansfield Street and from the south and west via Camp Road.

The following figure details the location of the site in the regional context.

Figure 1 Site Location Plan



2.3 SITE DESCRIPTION

The subject site is an irregular shaped parcel of land. It comprises 46.57 hectares and is legally described as Lot 1 in DP 1129191. The site has frontage to Mansfield Street. The site extends approximately 2.4 kilometres north from the southern boundary of the lot and is approximately 0.5 kilometres wide at its greatest width.

The subject site is located within a predominantly rural setting. To the north and east the site adjoins the Main Northern Railway. To the west the site adjoins the corridor for the proposed Hunter Expressway. A number of rural-residential land uses are located adjacent to the site to the south. The site is currently zoned 1(a) Rural 'A' Zone pursuant to the *Cessnock Local Environmental Plan 1989* (Cessnock LEP).

The general grade of the site runs west to east. As the property slopes from the railway line up to the F3 corridor, the proposed sidings will require some cut to be performed upon the site to ensure that railway grades are achieved after leaving the main rail line.

The topography of the area also shows some areas of Greta which are located to the east of the site are visible, however, the land to the west, due to both vegetation and topography cannot be seen from the site. The construction of the F3 Freeway on the western boundary, once constructed, would provide a significant barrier on the western extent to the site.

A small section of the site adjacent to the south-eastern boundary has been cleared and a horse training track has been established. The remainder of the site is vegetated to varying extents. The vegetation on site typically comprises a mix of Spotted Gum – Iron Bark Forest and Forest Red Gum – Iron Bark Forest. Some areas of regenerating shrub land are also present on site.

Two watercourses traverse the site including Sawyers Creek in the southern portion of the site, and an unnamed tributary of Anvill Creek in the northern portion of the site. A number of minor perennial streams also cross the site, which pass beneath the existing railway embankment via brick culverts.

Evidence of underground mine workings have been found on site with a portion of the site known to have been affected by subsidence in the past. A number of Indigenous and Non-Indigenous artefacts have also been found on site.

The previous uses of the site include underground mining activities and agricultural land uses including stock grazing. Anecdotal evidence suggests that the site may have been used as a dairy farm in the past. There is evidence of building waste on the site, such as scattered bricks and concrete pads which are consistent with the previous uses.

The site surrounds, as zoned in accordance with the Cessnock LEP include:-

- 2(b) Village zoned residential development to the east (at Greta).
- 1(c) Rural Residential development to the south-east (at Illalong).
- 1(a) Rural development to the south (adjacent to Tuckers Lane on the opposite side of the proposed Hunter Expressway).
- 2(b) Village zoned residential development to the west (at North Rothbury).

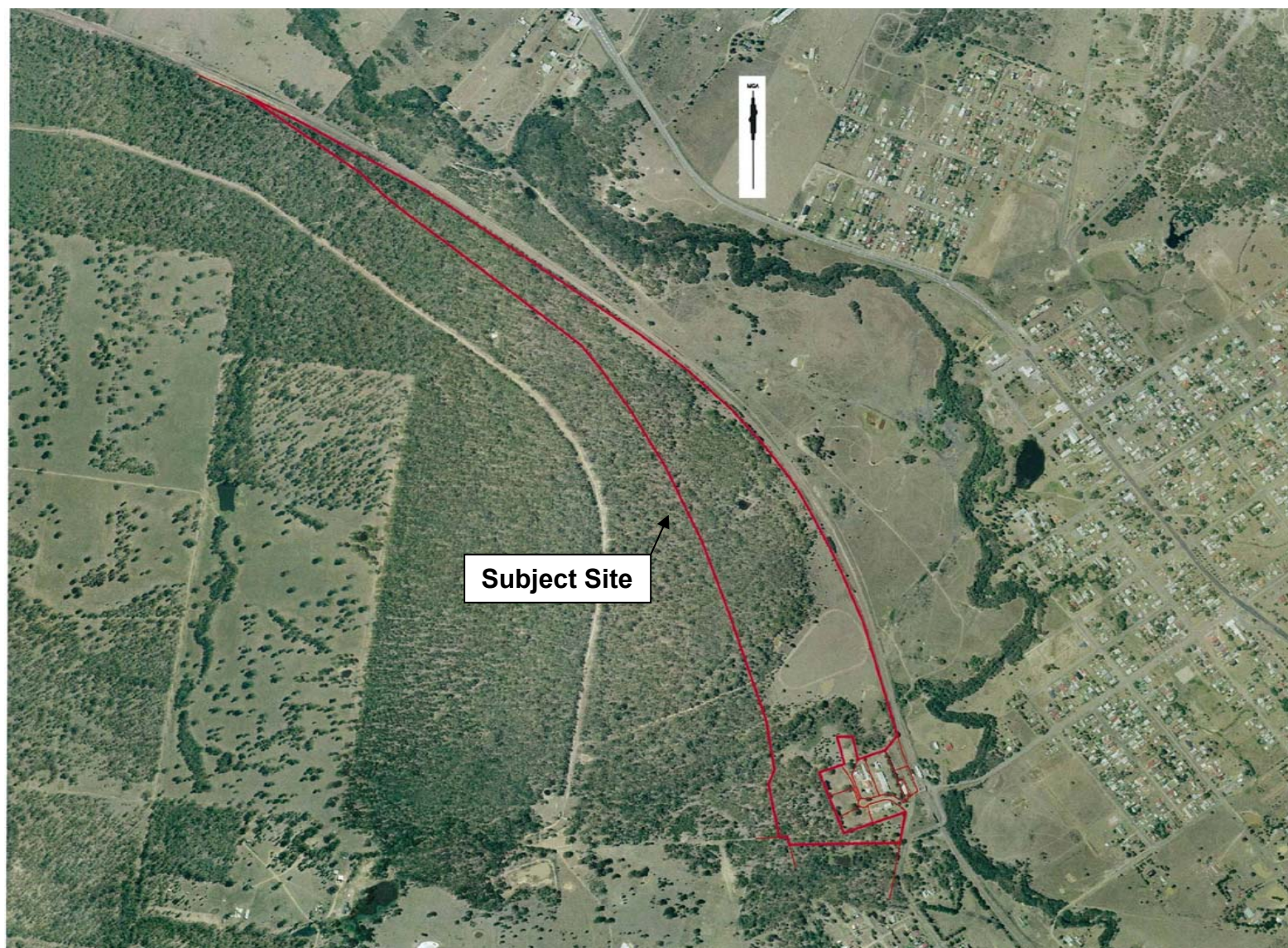
- 2(a) Residential zoned urban development to the north-west (at Branxton).
- 1(a) Rural development to the north (adjacent to the New England Highway).

With the exception of the residents directly adjacent to the south, the site is generally well distanced from sensitive receivers. The fringe areas of Greta lie approximately 1 kilometre from the centre of the site; the centre of Greta approximately 1.5 kilometres and North Rothbury and Branxton approximately 3 kilometres from the site.

The Project would also include connection of the rail tracks within the facility to the Main Northern Railway. ARTC are still finalising the location of the eastern boundary of the site as a result of the proposed third track. As such, this assessment covers the area subject to acquisition by ARTC as part of the proposed third track and therefore, has assessed the area subject to connection.

Figure 2 details an aerial photograph of the subject site.

Figure 2 Aerial Photograph of Subject Site



2.4 LOCATIONAL CRITERIA

Pacific National had some essential criteria that were used to determine an appropriate location for the Project. The following table details this criteria and provides an assessment of how the subject site meets the criteria.

Table 3 Location Criteria for Train Support Facility Site

CRITERIA	RESPONSE
The site must adjoin the existing rail line between Whittingham and Sandgate (near Kooragang Island)	The full length of the northern boundary of the site abuts the existing rail line. Greta is located between Whittingham and Sandgate.
Road Access must be provided	The site fronts Mansfield Street which is a public road. Access to the site from Mansfield Street is available. Additionally, the recently announced Hunter Expressway would service Greta via Branxton upon construction and would adjoin the site to the south-west.
The topography of the site must suit a Train Support Facility	The site has a suitably low grade to allow the construction of the facility. The relief across the site is in the order of 30 metres across its full length. While significant bulk earthworks would be required, the grade and relief of the subject site make the development feasible.
The facility requires a long access, egress and land area for trains to stand	This site is approximately 2.4 kilometres in length. The engineering design for the track layout provides the necessary length to meet track geometry and train length requirements.
Access to services and labour	The site is located close to the existing township of Greta, as well as other localities within the Hunter region including Cessnock, Maitland and Newcastle. The existing New England Highway makes the site easily accessible from these population centres. Furthermore, there is significant residential growth predicted within the region. Additionally, the region has a well established service base. As such, the site has sufficient access to services and labour.

While not a strict criteria for the Project, the site was in a single ownership and located between two major pieces of transport infrastructure.

As detailed above, the subject site has been selected to meet the locational criteria of Pacific National. Overall, it is considered that the subject site is appropriate for the Project and that the site constraints would be manageable.

3 PROJECT DESCRIPTION

3.1 INTRODUCTION

The Director-General's Requirements require that a detailed description of the Project be provided. Table 4 below details these requirements and identifies where in the EA they have been addressed:-

Table 4 Director General's Requirements for Project Description

REQUIREMENT	SECTION ADDRESSED
Location, site description and planning context	Sections 2.2 and 2.3 and Chapter 5
Project components and design elements (including site layout and responses to site constraints	Section 3.3
Construction and operational characteristics	Section 3.5 and 3.6
Identification of Project components and staging and timing.	Section 3.4

As detailed in the table above, a description of the site and location and planning context is provided in Sections 2 and 5 of this report. This chapter provides a description of the Project including components and design elements, construction and operational characteristics and details the Project components, staging and timing.

3.2 DESCRIPTION OF THE PROJECT

The Project is a Train Support Facility (TSF) and would contain five rail tracks plus sidings, a Provisioning Facility at the northern end of the site, as well as a Locomotive Wash Bay; Locomotive Maintenance Facility; Wheel Lathes; Wagon Maintenance; Road Vehicle Service Centre; Fuel Farm; and Administration building in the centre of the site and ancillary features such as an access road, lighting, landscaping and fencing. Earthworks and some vegetation clearance would be required on site to undertake the Project.

Vehicle access to the Project is proposed off Mansfield Street with a new access road proposed. The access road would cross Sawyers Creek at the point where the creek is suffering from its highest disturbance.

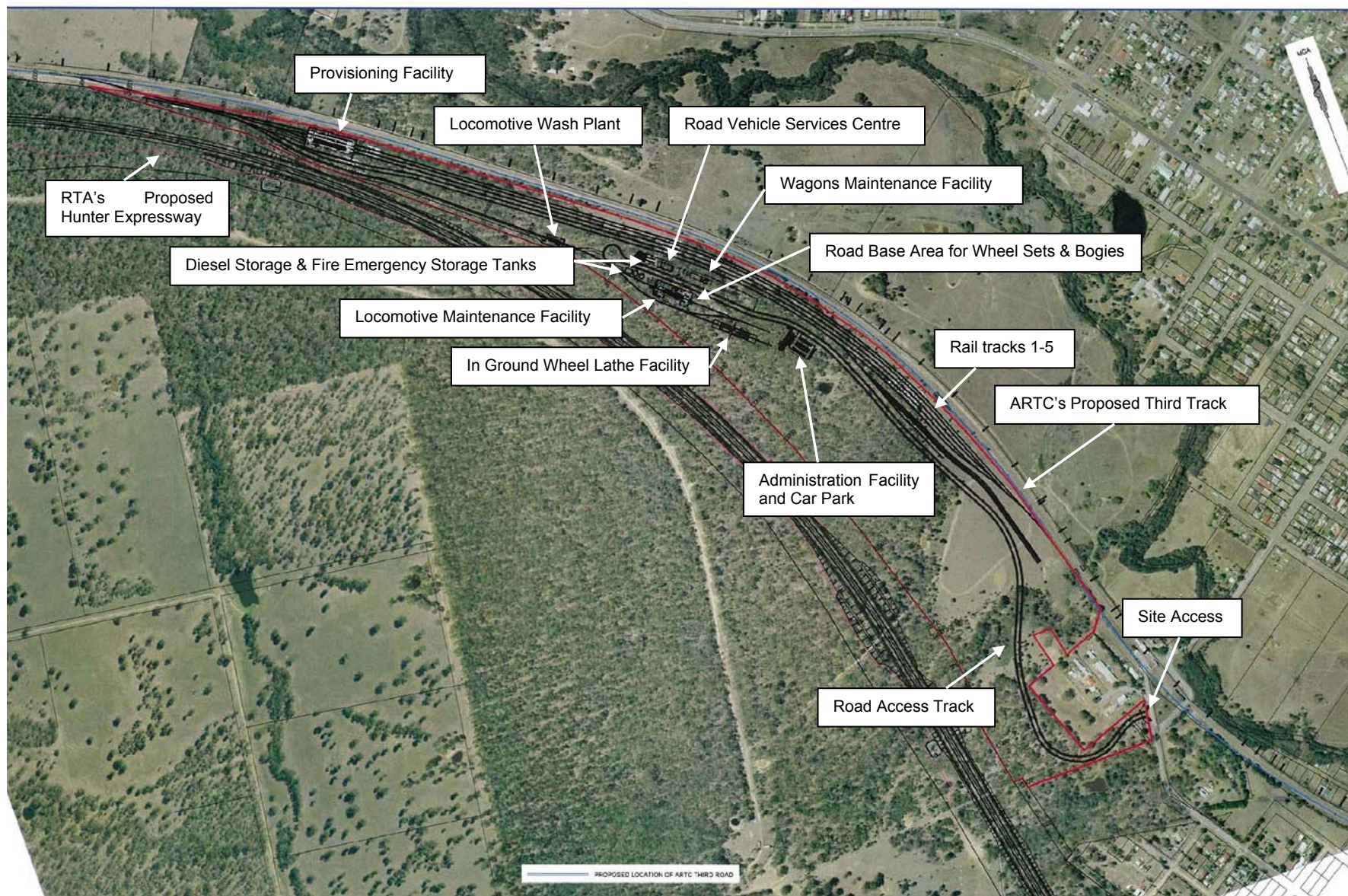
The creek crossing would be designed to withstand the effects of flooding and be located above the 1 in 100 year flood event.

The Project would also include connection of the rail provisioning tracks within the facility to the Main Northern Railway for train access. An initial connection is proposed for trains to exit off the main line at an approximate chainage 211.045. At this point trains would exit the main network and enter the facility. A second connection is proposed at approximate chainage 213.625 for trains to re-enter onto the main network. ARTC are still finalising the location of the eastern boundary of the site as a result of the proposed third track. As such, this assessment covers the area subject to acquisition by ARTC as part of the proposed third track and therefore, has assessed the area subject to connection.

The facility would operate as a service station for the existing and future trains owned and operated by Pacific National which use the Main Northern Railway line. Once trains have deposited their load of coal to the Port of Newcastle, they will return up the Hunter Valley to again bring commodities to the Port. It is on route while empty that these trains would be able to use the proposed Greta facility to be re-fuelled, maintained and when necessary change crews. The trains operate 24 hours a day, seven days a week, and as a result the facility needs to be available to service the trains on this basis. If this is not possible, this would represent a significant constraint on the delivery of coal to the Port of Newcastle and obstruction within the Hunter Valley coal chain. Once the trains have been re-fuelled and serviced, they will return to the network for their proposed destination.

As discussed in Section 2 of this report, the site is well located between the proposed Hunter Expressway and the Main Northern Railway. The following figure provides an overview of the Project in the context of the proposed Hunter Expressway and ARTC's third track on the Main Northern Railway.

Figure 3 The Project in the Context of the Proposed Hunter Expressway and ARTC's Third Track



3.3 PROJECT COMPONENTS AND DESIGN ELEMENTS

It is proposed to stage the development to meet Pacific National's user requirements. For the purposes of determining the maximum impact of the Project, a description of the Project at full capacity is provided.

To achieve full capacity, the project comprises a number of separate components and design elements. The following description provides a total overview of all project components. The construction of these components will be staged in accordance with staging details contained in Section 3.4.

Details of the project components and design elements are provided below:-

- **Rail Tracks**, including:-
 - Two Maintenance Tracks.
 - Three Provisioning Tracks.
 - Wagon Sidings.
- **Locomotive Maintenance Facilities**, including:-
 - Provisioning and Inspection Facility.
 - Service Facility.
 - Locomotive Wash Facility.
 - Wheel Lathe Facility.
- **Wagon Maintenance Facilities**, including:-
 - Wagon Maintenance Hard Stand Area.
 - Wagon Maintenance Support Facility.
 - Rolling Stock in Ground Wheel Lathe Facility.
- **Administration Facilities**, including:-
 - Administration and Office Facilities.
 - Canteen Facilities.
- **Road Vehicles Service Centre**, including:-
 - Truck and Vehicle Storage.
 - Store room, amenities and lunch room.

- **Ancillary Facilities**, including:-
 - Fuel Farm containing diesel tanks. Diesel would be stored on site in accordance with AS1940-2004.
 - Electrical Infrastructure.
 - Service vehicles garage.
 - Water storage, water treatment and sewerage treatment facilities.
 - Fencing, including security fencing along the western boundary.
 - Car parking and access roadways.
 - Lighting along all roads and throughout the Project to allow work to be completed on a 24/7 basis.
 - Landscaping which is sympathetic to the site and the local environment.
 - In addition to the components above, civil works including earthworks, would be required to allow the construction of the roads at suitable grade.

These Project components are described in detail below:-

3.3.1 RAIL TRACKS

It is proposed to construct five rail tracks as part of the Project in addition to some cripple wagon sidings.

Tracks 1 - 3 would service the Provisioning Facility and Tracks 4 and 5 would be used for maintenance purposes.

The Project would connect to the main network at approximate chainage 211.045. At this point trains would exit the main network and enter the facility. A second connection is proposed at approximate chainage 213.625 to allow trains to re-enter the main network. It is proposed to connect to ARTC's third track. As discussed above, ARTC are still finalising the location of the eastern boundary of the site as a result of the proposed third track. The connection agreement to allow connection of the Project to the existing network has been progressed as a separate process to the Project Application and has been obtained subject to conditions.

The tracks servicing the Project have been designed with consideration of the concept design of the third track. All tracks servicing the Project would be constructed at a suitable grade to tie in with the third track, and an appropriate length so as to not cause an impact on main line rail movement.

Track lengths are based on a train length of 1564 metres, which allows for the maximum standard train length of 1542 metres (comprising three locomotives plus 91 wagons), plus allowance for one additional locomotive for transfer purposes. The maximum length of the wagon consist is 1476 metres.

Tracks 1 - 3

The lengths of each of Tracks 1, 2 and 3 will comprise five parts:-

1. The portion before the Maitland end Clearance Point, on which trains cannot stand without interfering with other tracks.
2. The portion between the Clearance Point and the point where Pacific National's safety clearance for maintenance purposes is achieved, on which trains may stand but where maintenance cannot be carried out.
3. The portion between the safety clearance point and the point at which the lead end of the lead vehicle must stand to receive an air supply. Maintenance may be carried out over the entire length of this portion.
4. The 6 metres necessary to allow a road vehicle access before the commencement of the ramps leading to the depressed floor in the Provisioning Shed. Occupation of this 6 metre area will prevent road vehicle access.
5. The 10 metre portion between the commencement of the ramps and the arrival end of the Provisioning Shed.

The dimensions shown on Drawings 402D and 150/6 submitted with the application are summarised in the table below. (Note that Portion i. is omitted as not relevant to train stowage).

Table 5 Dimensions of Rail Tracks 1 - 3 (m)

TRACK/PORION	ii	iii	iv	v	TOTAL
1	56	1622	6	10	1694m
2	92	1477	6	10	1585m
3	88	1477	6	10	1581m

Tracks 4 and 5

The lengths of each of Tracks 4 and 5 will comprise four parts:-

1. The portion before the Maitland end Clearance Point, on which trains cannot stand without interfering with other tracks.
2. The portion between the Clearance Point and the point where safety clearance for maintenance purposes is achieved, on which trains may stand but where maintenance cannot be carried out.
3. The portion between the safety clearance points at each end of the Siding. Maintenance may be carried out over the entire length of this portion.
4. The portion between the Branxton end Safety Clearance Point and the Clearance Point on which trains may stand but where maintenance cannot be carried out.

The dimensions shown on Drawings NB1151-RA-207 to NB1151-RA-210 submitted with the application are summarised in the table below (Portion i. is omitted as not relevant).

Table 6 Dimensions of Rail Tracks 4 – 5 (m)

TRACK/PORION	ii	iii	iv	TOTAL
4	46	1487	46	1631m
5	46	1483	46	1627m

Other Track Features

A signalling interface with ARTC's network would be constructed which necessitates PN maintaining a yard control facility. It is proposed that locomotives would achieve a maximum arrival speed of 45km/h (set by the capabilities of the Newcastle end yard turnouts) and a maximum departure speed of 45km/h (set by the capabilities of the Branxton end yard turnouts).

The tracks have been designed with capacity to routinely accept rolling stock, including six axle locos, with a 30t axle load as well as rolling stock built to the current ARTC Standard Rolling Stock outline, which allows a maximum width of 3050mm.

The finished ground levels at track sleeper top height would allow road vehicle based maintenance on Tracks 1 and 2, and crane or fork lift based bogie or wheel changes on the Down side of Track 3 for the track lengths described as iii. in the above tables.

3.3.2 LOCOMOTIVE MAINTENANCE FACILITIES

Locomotive maintenance facilities for the Project are described below. The locomotive maintenance facilities would include a Provisioning Facility, a Locomotive Servicing Facility and a Locomotive Wash and Wheel Lathe Facility.

Provisioning Facility

A Provisioning Facility would be constructed in the northern portion of the site. The Provisioning Facility would comprise a building of approximately 80 metres by 24 metres, to a height of 9 metres. Twelve sand storage containers would be constructed on the roof of the Provisioning Facility and a roof walkway would be installed to allow roof access.

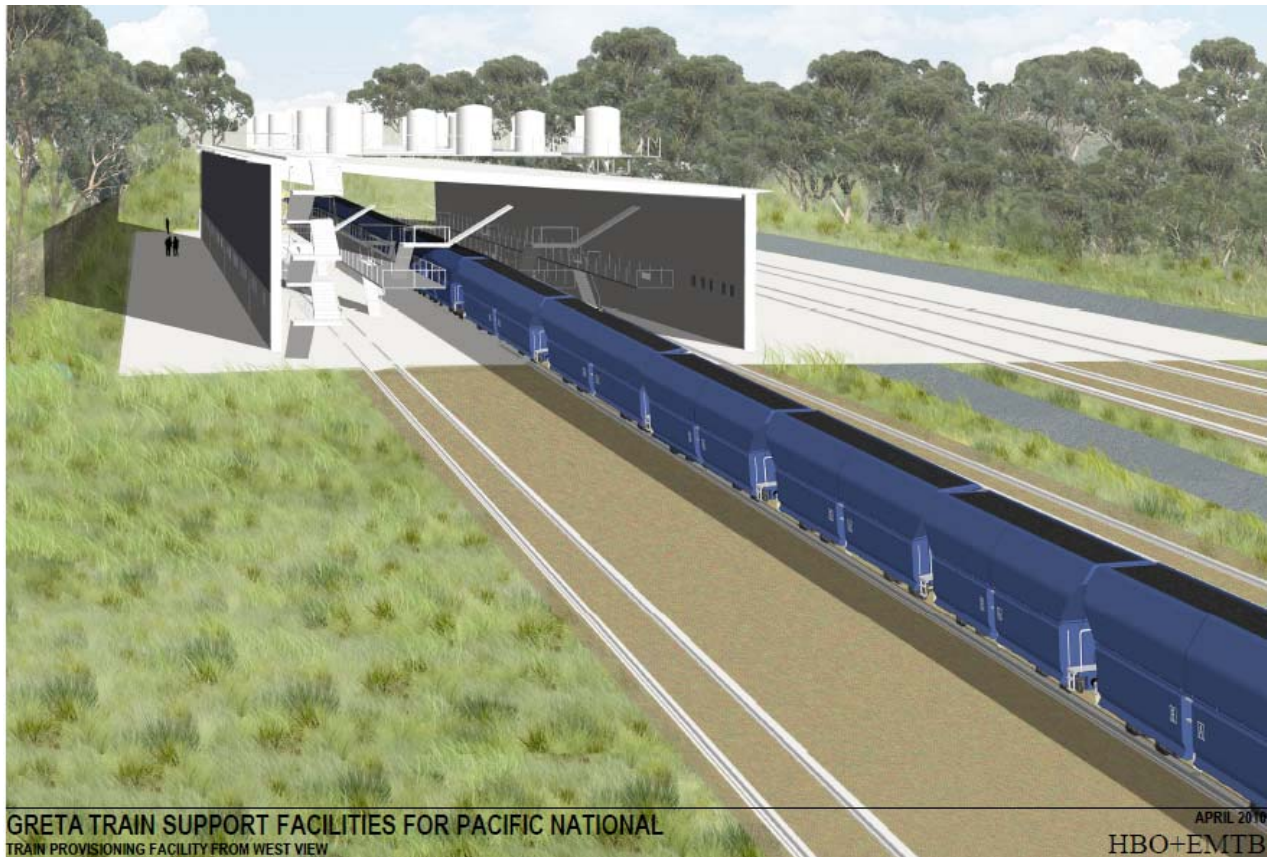
The Provisioning facility would be used to re-fuel locomotives, as well as undertake sanding and oiling. Three rail tracks would service the Provisioning Facility. The Provisioning Facility would be equipped with a fuel delivery system to permit nine locomotives (i.e. three train sets) to be fuelled simultaneously.

The Provisioning Facility would have the ability of the departure end track work to enable the exchange of four 22 metre locos between any two tracks. Safe staff access across trains would be provided by the below rail access to the locomotive servicing pits.

The Provisioning Facility would also have office accommodation suitable for two computer workstations, a small meals room, toilets and shower facilities. An upper platform would also be constructed within the facility.

The following figure details a view of the proposed provisioning facility from the west.

Figure 4 View of Provisioning Facility from West (Source: HBO+EMBT, 2010)



Locomotive Service Facility

A Locomotive Service Facility would be constructed within the centre of the site, serviced by a single rail track. It would be approximately 30 metres by 80 metres to an approximate height of 13.5 metres. The Locomotive Service Facility would contain a service facility; storage area; plant room; compressor and a welding workshop as well as an office area; meals room and amenities. A mezzanine level would be constructed within the facility providing additional storage rooms and a hydraulic bridge. Three visitor car parking spaces would also be constructed adjacent to the building.

Locomotive Wash Facility

A Locomotive Wash Facility would be constructed between the Locomotive Service Facility and the Provisioning Facility. The wash facility would be approximately 7 metres in width by 27.5 metres in length; no roof would be constructed over the wash facility. The wash facility would be equipped with an oil silt trap.

Locomotive Wheel Lathe Facility

An in ground wheel lathe would be constructed in the centre of the site between the administration facility and the Locomotive Service Facility serviced by a single track. The wheel lathe facility would have a depressed floor and would also contain a small office, store room and amenities area. It would have a building footprint of approximately 12 metres by 64 metres and be constructed to a height of approximately 10.5 metres.

3.3.3 WAGON MAINTENANCE FACILITY

A Wagon Maintenance Facility would be constructed adjacent to a bogie storage area within the centre of the site to the north of the Locomotive Service Facility.

A store, single office, meals room and amenities would be constructed within the building. A small workshop would also be constructed. The Wagon Maintenance Facility would be approximately 8.6 metres high, 48 metres in length and 10 metres in width.

3.3.4 ROAD VEHICLES SERVICE CENTRE

A Road Vehicles Service Centre would be constructed between the Locomotive Service Facility and the rail tracks. This facility would incorporate three vehicle storage bays within the building as well as a single axle truck storage area covered with a carport. A small store, amenities area and meals room would also be constructed within the building. The building would be constructed to an approximate height of 8.6 metres. It would have a building footprint of approximately 33 metres by 12 metres.

The following figure details the view of the road vehicles service centre, wagons maintenance facility and locomotive service centre.

Figure 5 View of the Road Vehicles Service Centre, Wagons Maintenance Facility and Locomotive Service Centre (Source: HBO+EMBT, 2010)



3.3.5 ADMINISTRATION FACILITIES

Administration facilities would be provided on site to allow for administration and some operations control activities to be undertaken. The administration facility would be located within the centre of the site and would be the southern most building on site. It would have a building footprint of approximately 8.5 metres in width by 43 metres in length. It would be constructed to a height of 4.3 metres. The administration facility would contain office space, meetings/training rooms and storage areas, as well as showers and lockers and amenities. 75 car parking spaces would be constructed adjacent to the facility to allow it to be used as a sign on location for train crew and Provisioning Shed staff. Two disabled car parking spaces would also be provided.

3.3.6 **ANCILLARY FACILITIES**

In addition to the administrative and operations control facilities, a number of ancillary facilities are provided on site to assist in the overall functioning of the site. These facilities include:-

- A Fuel Farm containing diesel tanks.
- Electrical Infrastructure.
- Water storage, water treatment and sewerage treatment plant.
- Fencing including security fencing.
- Car parking and access roadways.
- Lighting along all tracks to ensure work can be completed on a 24/7 basis and to ensure personnel safety.
- Landscaping which is sympathetic to the site and the local environment including a landscaped acoustic bund.
- Signage.
- Fire Systems.
- Waste Systems.

These facilities are described below:-

Fuel Farm

The Fuel Farm would be located in the centre of the site to the west of the Road Vehicles Service Centre.

It would contain 12 diesel tanks providing a storage capacity of approximately 2 million litres. Each tank would be approximately 6 metres in height. The tanks would be secured with a 1.8 metres high chain wire fence. Diesel would be stored on site in accordance with AS1940-2004. A loading bay would be constructed to the south of the Fuel Farm adjacent to fuel fill points. It is proposed to use Tri-axel semi trailers or B-doubles to deliver fuel to the site. The fuel farm has been designed with suitable access for B-doubles.

Electrical Infrastructure

Electrical infrastructure would be provided on site. Discussions have been held with Energy Australia. The location and design of any electrical substation on site would be finalised during preparation of the detailed design.

Drainage, Water Storage, Water Treatment and Sewerage Treatment Plant

The Project would include surface and sub-surface stormwater drainage including main trunk drains; secondary/tertiary drains; roadside gutters, track culvert drainage; intercepting drains; tank bunds; silt traps; and retention ponding. There is also a provision for trade waste, wash-down drainage and external drainage from bunded areas.

An oily waste water collection, treatment and disposal system is also proposed to prevent the contamination of land with hydrocarbons. Oily waste water is generated from the following areas:-

- Locomotive Provisioning Facility.
- Locomotive Workshop.
- Wagon Support Workshop/Store.
- Locomotive Wash-down Facility.
- In-ground Wheel Lathe Facility.
- Road Tanker Decanting Gantry.
- Vehicle Maintenance/Workshop.
- Lubrication Oils Storage Area.

Further information regarding water storage and water treatment is contained in Section 16 of this report.

Fencing and Site Security

The site shall be securely fenced. Only one road entrance shall be provided, with appropriate signage and gate control.

Car Parking and Access Roadways

Car parking areas shall be constructed for visitors and staff. Sufficient space shall be provided for all employees plus visitors totalling 80 spaces.

The Administration Building would contain 75 spaces, the Provisioning Facility would contain two spaces and the Locomotive Maintenance Facility would contain three spaces.

Road works would be undertaken on site to allow for rail track level crossings; truck/car vehicular movements; hardstand; parking areas; stores delivery; and pedestrian walkways. An all weather service road system, as shown on SKM drawing NB11151RA402F, would be constructed to service the site. This access road would service the administration building, the fuel receive point and the bogie/wheel-set delivery point with a turning bay suitable for a B Double and lay-bys suitable for unloading/loading.

Lighting

Lighting would be erected along all tracks to ensure work can be completed on a 24/7 basis and to ensure personnel safety. Lighting is discussed further in Section 15 of this report.

Landscaping

Moir Landscape Architecture has prepared a Landscape Masterplan for the site. A copy of this plan has been submitted with the Project Application. Landscaping of the site has been designed to improve aesthetic appearances and minimise dust and noise pollution. The landscape plan uses plantings that are endemic to the area suitable for the conditions applicable on site. Native trees and shrubs requiring minimum attention are used throughout the Project. A copy of the Landscape Masterplan for the site is contained in Appendix Q.

The Landscape Masterplan for the site contains a number of key features including:-

- Noise attenuation mound – an approximate 3 metre high mound would be constructed at the southern end of the site adjacent to the access road. This would provide some form of acoustic mitigation.

The Noise attenuation mound is discussed further in Section 9.5 of this report. The acoustic mound would be mass planted with native grasses and trees.

- Proposed revegetation zone – It is proposed to revegetate areas of the site which are currently cleared.

This revegetation would also be reflected in the Ecological Restoration Plan to be prepared for the Project, as discussed in Section 7 of this report. The revegetated areas would contain supplementary planting to reflect vegetation communities originally occurring on site.

- Access road – small scale plantings would be planted adjacent to the access road to define the entrance to the Project.
- Administration facility and car park – Plantings are proposed around both the administration facility and the main car park to provide amenity for users of the facility and car park. Landscaping incorporates the relevant bushfire protection measures.
- Existing vegetation to be retained and protected – The existing vegetation unaffected by bulk earthworks and proposed infrastructure is to be retained and protected.
- Bushfire Protection – Proposed defensible spaces would be provided where buildings adjoin existing vegetation as discussed in Section 10.5.

Signage

Signage throughout each facility would emphasise safety. This applies to traffic movement, hazardous areas, storage materials, hoisting, etc. Safety signage, statutory signage and notice boards shall be provided throughout the facilities and at the entry to the facility. Additionally, a logo together with identified signage would be displayed prominently on two sides of each building, for example on the main line side and at the entry to the administration office, as well as at the site entrance gates on Mansfield Street.

Fire Systems

Fire safety systems would be established throughout the site in accordance with the relevant Australian Standard.

Waste Systems

Areas for waste removal, including bin storage, would be established on site in convenient locations adjacent to the buildings on site. All waste would be recycled where possible or collected by a contractor.

3.4 STAGING

The Project has been assessed at full capacity however, to reflect Pacific National's operational requirements, all tracks will not initially be required. As such, it is proposed to stage the operations of the project into three stages. Within these three operational stages, a number of separate construction stages are proposed. These stages are discussed in detailed below, and are shown in the staging plans prepared by SKM (NB 11151 RA 401F and 402F) submitted with the EA to the DOP.

3.4.1 STAGE 1

Stage 1 is proposed to have a 12-14 month construction duration commencing September 2010. However, Pacific National's operational goal is to have the Project operational by mid 2011. Consequently, Pacific National would be discussing opportunities with future contractors to reduce the construction timeframe. If reductions in this timeframe result in increased impacts within the locality, these would need to be assessed against the relevant environmental requirements.

Stage 1 comprises three core elements being:-

- Stage 1A – Access road
- Stage 1B – Bulk Earthworks
- Stage 1C – Site facilities including:-
 - Tracks 1, 2 and 3.

- Provisioning Facility to service three tracks.
- Facility access road and infrastructure necessary to support provisioning (oil storage, fire systems including water tanks, water and electricity).
- Diesel storage to be a minimum of 1.0 million litres (with allowance to grow to 2.0 million litres in Stages 2 and 3).
- Wagon maintenance facility capable of basic administration and maintenance.
- Road base area for wheel sets and bogies.
- Locomotive maintenance facility access track on which a basic/temporary locomotive wash bay will be located.
- Road Vehicles Service Centre.
- Car Park.
- Turnouts to main line.
- Water quality system including detention basins.
- Ancillary development including site fencing and access gate, landscaping etc.

For Stage 1, a section of the proposed loco maintenance centre access siding to be equipped with a loco wash-down facility would also be constructed.

The track length servicing this facility would be sufficient length to enable 160 metres of wagons to be stored between the wash-down and the dead end of the track.

3.4.2 STAGE 2

Stage 2 is proposed to have a 12 month construction duration commencing September 2013, allowing operation in September 2014. At the end of Stage 2 it is proposed that the following additional facilities would be present on site:-

- Construction of maintenance and inspection Tracks 4 and 5.

- Relocate locomotive wash bay towards future loco maintenance facility.
- Construct wagon storage sidings.
- Construct administration building.
- Diesel storage to increase from 1.0 million litres to 2.0 million litres.
- A shunting neck at the Branxton end of the provisioning shed.

3.4.3 STAGE 3

Stage 3 is proposed to have a 12 month construction duration commencing September 2017, allowing operation in September 2018. At the end of Stage 2 it is proposed that the following additional facilities would be present on site:-

- Locomotive maintenance facility
- Wheel lathe facility

3.5 CONSTRUCTION

Stage 1 includes three construction Phases as detailed below:-

1. Initial clearing and bulk earth works on the site, including the construction of the access road and blasting and crushing activities.
2. Laying of tracks for each of the arrival roads.
3. Construction of buildings and their ancillary requirements, such as water tanks and waste water facilities.

In considering the above Phases and the likely timing of the construction, the first component being the clearing of bulk earth works as well as blasting and crushing activities, is likely to create the largest impact on nearby residents. Preliminary geotechnical investigations undertaken by Pacific National indicate areas exist within the proposed development site that requires blasting to enable final site levels to be achieved.

Blasting will be required to excavate approximately:-

- 40,000m³ of rock between chainages 211250 and 211650; and
- 10,000m³ of rock between chainages 213250 and 213450.

The location of the proposed blasting areas is provided in Figure 33 in Section 9.3.10. The impacts generated by these activities would relate primarily to dust and noise generated by the construction activities and are assessed in Sections 9 and 13 of this report. The amount of bulk earth works undertaken on site is detailed in **Figure 7**. Approximately 207,000m³ of cut would be required on site, while approximately 157,000m³ of fill would be required on site. This would result in an excess of 50,000m³ of fill material on site. Excess fill would be reused on site either during construction of the proposed acoustic mound in the southern section of the site or spread out in currently cleared areas which would be revegetated.

In relation to construction Phases 2 and 3, which are the rail construction and construction of buildings and their ancillary services, the issue of noise and dust are likely to be significantly reduced, when compared to Phase 1, with the prominent impact for Phases 2 and 3 being the construction traffic.

These impacts have been considered within the following construction hours:-

- Monday to Saturday - 7:00am to 6:00pm.
- Sundays and Public Holidays - no work.
- Where work is required outside of these hours the following measures would be implemented:-
 - Inform neighbours of proposed works and timing.
 - Keep works to a minimum.
 - Where relevant, engage an acoustic specialist to monitor potential acoustic impact within the locality.

The following table outlines the key elements of construction, the timing of those activities within the construction program and their likely key impacts for Stage 1 works.

Table 7 Indicative Construction Timing

ACTIVITY	CONSTRUCTION PERIOD	DURATION OF ACTIVITY	LIKELY KEY IMPACTS
Injection Grouting	First 3 months	8 weeks	Noise
Site Services Relocation	First 3 months	3 weeks	Negligible impacts
Erosion and Sediment Control	First 3 months	2 weeks	Positive impact in protecting water courses
Tree Clearing and Mulching	First 3 months	4 weeks	- Noise - Environmental
Strip Topsoil to Stockpile	First 3 months	5 weeks	- Noise - Dust
Earth Works to Internal Access Roads	First 3 months	4 weeks	- Noise - Dust
Bulk Earth Works Including Rail Embankments	First 6 months	20 weeks	- Noise - Dust
Final Trim to Embankments	Month 5 to 7	6 weeks	- Noise - Dust
Rock Profiling	Month 1 to 4	11 weeks	- Noise - Dust
Stormwater Drainage	Month 1 to 3	9 weeks	- Environmental - Noise
Pavement Gravel to Internal Roads	Month 1 to 4	8 weeks	Noise
Kerb for Internal Roads	Month 4 to 5	4 weeks	- Traffic - Noise
Building Preliminary Works, Services etc.	Month 4 to 7	10 weeks	- Traffic - Noise
Building Structures, Slabs, Walls	Month 6 to 13	25 weeks	Traffic
Building Completion Including Detail Fit Out	Month 13 to 14	13 weeks	Traffic
Load Rail Including Switches	Month 7 to 14	28 weeks	Noise
Miscellaneous Items Including Finalising Landscaping, Lighting, sealing of pavements etc	Month 14	8 weeks	Negligible impacts

Based on the above table, the impact of noise is likely to continue throughout the Project however, the extent of this impact will change following the end of bulk earth works which will generate more noise than general building construction undertaken in the second half of the Project.

These two phases and the different noise impacts are represented in the noise model undertaken by Advitech. This has been discussed in Section 9 of the Environmental Assessment.

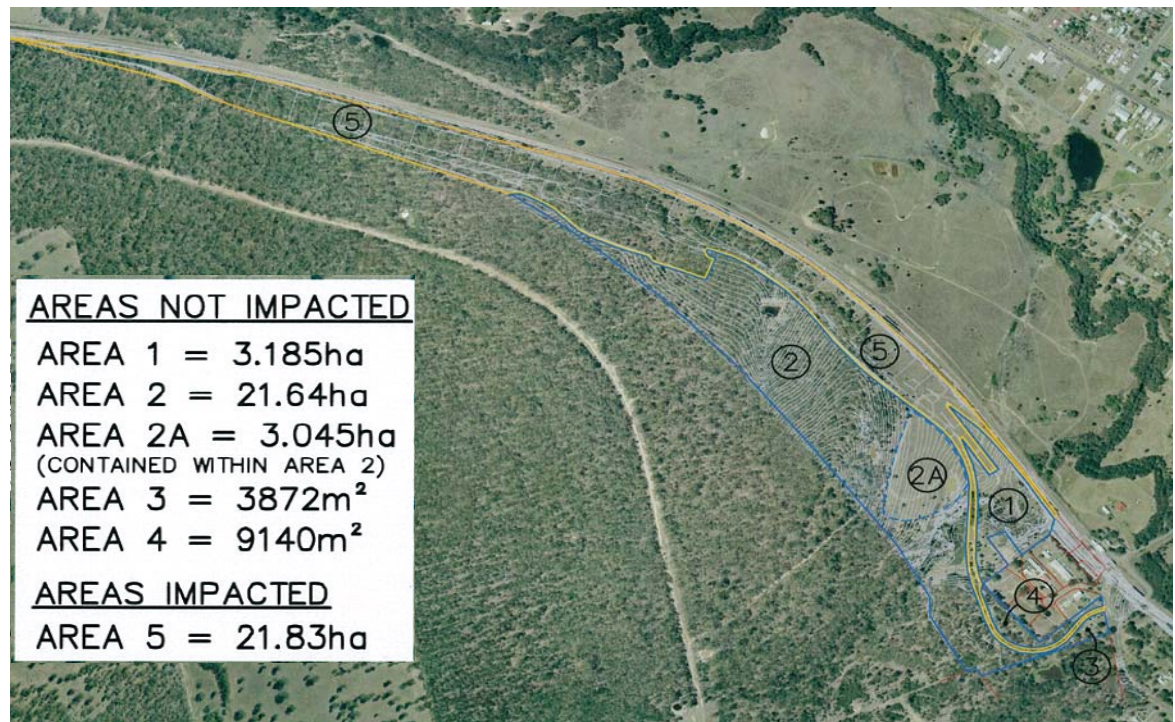
The issue of air quality has been discussed in Chapter 13 of the Environmental Assessment, however from the above table it demonstrates that the impact will be during the first six months of construction due to the building of the access road and the bulk earth works on site. The later elements of the construction are likely to reduce significantly lower levels of dust compared to the initial stage. During the first component of the construction phase, mitigation measures will be employed such as the use of water carts, visual monitoring of dust levels for directed use of water carts, and also monitoring of atmospheric conditions.

The above table also highlights that construction traffic will become a more significant issue in the second half of the construction program, this is as a result of anticipated contractors on the site during building works associated with the administration centre and provisioning centre.

By comparison, in the initial stages including bulk earth works which covers the first six months of the construction program, approximately 30 staff will be on site during this time and deliveries to and from the site would be minimal. However, as the construction phase leads into the construction of rail and in particular buildings on the site, this is expected to relate to a significant increase in workers on site and deliveries of materials to the site generating more traffic. This issue has been considered in Chapter 8 of the Environmental Assessment.

The two key environmental areas that have been identified which relate to the ecological impacts include site clearing and drainage works. The site clearing will remove endangered ecological communities and potential foraging habitat for species while the creation of drainage on site will collect and concentrate water flows into the existing water courses. These impacts have been considered in detail in the Environmental Assessment and have been discussed in Chapters 7 and 16 respectively providing mitigating measures for each of these impacts. The following figure details the area of the site to be impacted by the Project. Figure 6 demonstrates that approximately 21.83ha of the site would be impacted by the Project. This figure is slightly higher than the area which is identified as subject to vegetation removal, being 18.5ha as discussed in Section 7, as it includes a large portion of grassed area which does not contain any vegetation.

Figure 6 Area of Site Impacted by the Project



Construction of Stages 2 and 3 would include the erection of additional buildings and site facilities only. No earth works or site clearing would be undertaken as part of construction for Stages 2 and 3. All earth works for the Project are proposed to be undertaken during Phase 1 to minimise the potential impact of future construction. It is expected that during the construction of these Stages of the Project, potential impacts such as traffic, would be able to be managed to an acceptable level. This is discussed in detail in Section 9 of this report.

3.5.1 CONSTRUCTION TIMING

It is expected that construction of Stage 1 of the Project would take 12-14 months. However, Pacific National's operational goal is to have the Project operational by mid 2011. As a result, Pacific National would be discussing opportunities with future contractors to reduce the construction timeframe to get as close to their operational timeframe as possible.

Should the reductions in timeframe change the anticipated impacts of construction, these would need to be assessed against the relevant environmental requirements. It is expected that Stage 2 and Stage 3 would each take 12 months commencing September 2013 and September 2017 respectively.

3.5.2 BUILDING CONSTRUCTION MATERIALS

The following text details general building materials of the facilities contained within the Project.

Walls

Building external walls shall generally comprise precast concrete panels to 2.5 metres above ground level, with 'Colourbond' industrial grade steel complete with fire retardant, 'Tuffskin' fibreglass building blanket or equivalent.

Roofs

Roofs shall generally comprise 'Colourbond' or equivalent industrial grade steel, suitable for the site conditions. All roofs shall be insulated. Insulation materials shall be fire retardant, 'Tuffskin' fibreglass building blanket or equivalent. Where required, stainless steel gutters and downpipes shall be provided. Sizes to comply with local authorities, codes and regulations.

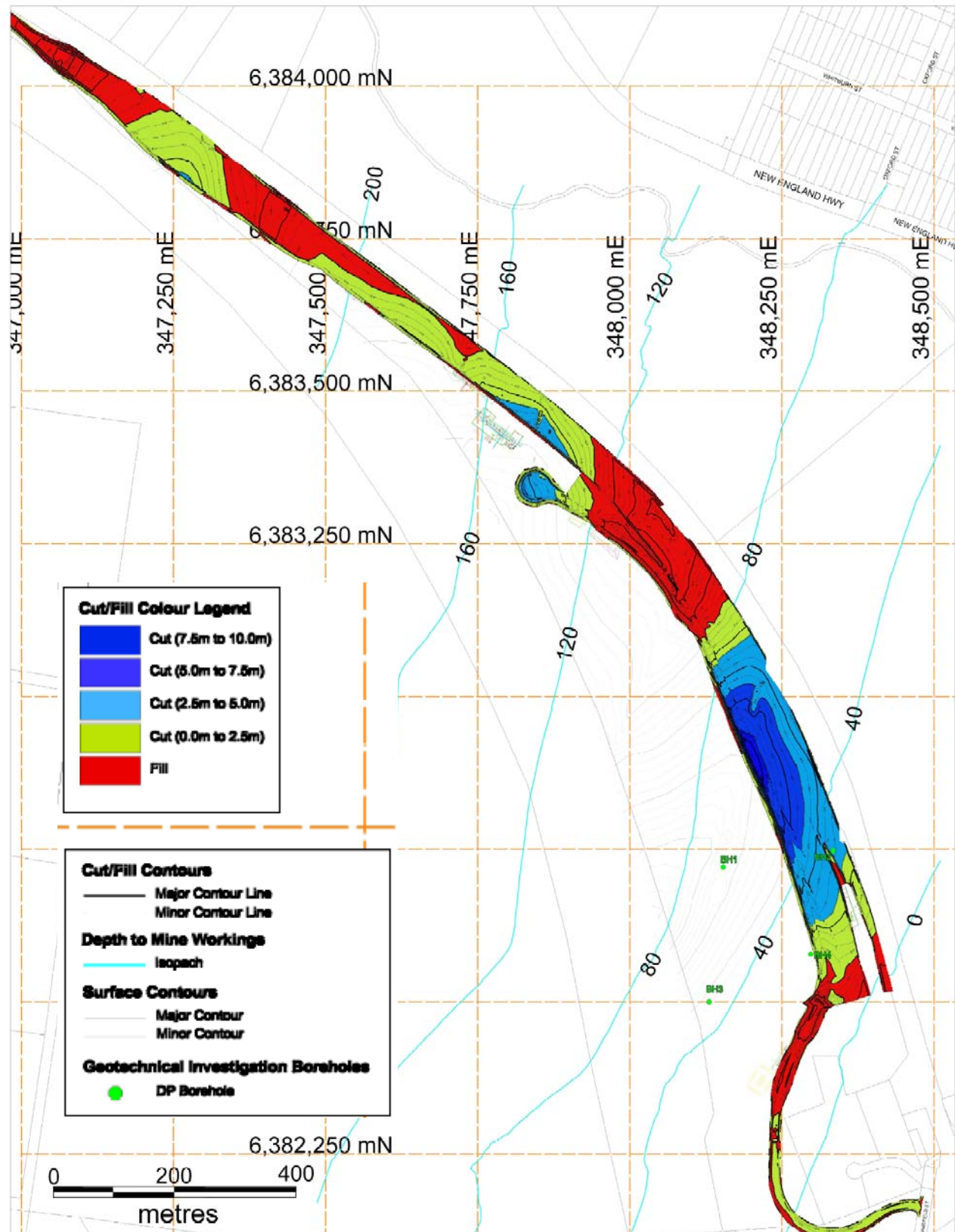
Floors

All floors shall be concrete, designed to suit the loadings expected in respective work areas. All concrete shall be finished with appropriate sealers to inhibit scuffing and staining. Floors shall generally be flat and level, with a maximum permissible gradient of 1 in 250. Concrete aprons shall be graded away from buildings, to allow wash-down or run-off water to flow away freely without ponding.

Doorways

Grated drains shall be installed inside all perimeter doorways including personnel doors, to prevent the spread of stormwater into buildings. Drip channels shall be fitted above all personnel doors. All doorways shall have appropriate glaze panel lift doors/shutters fixed to same.

Figure 7 Proposed Cut and Fill for the Project



3.6 OPERATIONAL DETAILS

It is proposed to operate the facilities within the Project 24 hours a day, seven days a week. The operations of the Project, and consequently staff numbers and traffic movements, would intensify as the stages are complete. A number of core activities would be undertaken on site during the operation of the Project.

3.6.1 CORE OPERATIONAL ACTIVITIES

The core operational activities of the TSF are broken into four key components, these include:-

- Re-fuelling.
- Maintenance and Inspection.
- Crew Changes.
- Administration.

Further detail regarding the core operational components of the Project is provided below.

Re-fuelling

This will require storage of oil and diesel on the site to allow for the re-fuelling of locomotives on an as required basis. Re-fuelling would be undertaken in the Provisioning Facility.

Locomotive and Wagon Maintenance

Maintenance of both wagons and locomotives will be required and ranges from minor examinations to scheduled servicing, as detailed below:-

Wagon Maintenance Tasks

The type of maintenance to be provided follows the Unit Train Maintenance (UTM) model used at present in the Hunter Valley. This comprises of:-

- Unit Train Based consists.
- FX (Full Train Brake Examination) examination every 14 days.

- UTM - Unit based 112 days (alternative is block type inspection).
- Scheduled Maintenance (SM) inspection every three years.

UTM

The Unit train is taken out of service, typically 12 to 24 hours. These services are based on a 112 day cycle.

FX Exams

By terminal operators or train crew, the period to be determined by rake based wagons could be expected to be inspected only every 14 days. This is a walk-around check, brake block changes and Level 1 repairs by Terminal operators, train crew or maintainers. This may need to be reviewed based on brake block wear and other reliability issues.

Out of Course (OOC) Repairs

Minor repairs to be attended to by Terminal Operators as is current practice at all terminals. This includes block changes and minor off the belt repairs.

Maintainers will respond in flying gang vehicle to more major OOC repairs requiring extra tooling, parts, skills not available to the Terminal operators. If required for more major repairs, wagons marked off can be shunted back to the workshop.

Shunting

The Project has been designed to minimise the need for shunting activities to take place on site. Shunting activities are unlikely to occur on site on a regular basis as the facilities on site are designed to accommodate whole trains. Where shunting activities would be required operational measures would be implemented to minimise the generation of impulsive noise associated with the impact of empty wagons. Shunting of wagons requiring OOC and scheduled work will be performed by train crew into a handover area where a shunt tractor will be used by maintainers to shunt them for placement outside the maintenance facility. Shunts occurring outside of the wagon maintainer hours will need to be done by other staff on site.

Shunting of strings of wagons in excess of the capability of the shunt tractor will need to be done by operational staff.

Roll-by Inspections

An inwards Roll-by inspection should be undertaken. This will identify some faults prior to reloading and the associated delays when trying to repair loaded wagons on an outbound train. Terminal operators/train crew should conduct roll by inspections.

Door Inspections

Roll-by door inspections should be undertaken upon unloading. This will identify any door faults prior to reloading and serve as a check for the doors to make sure they are closed.

Scheduled Maintenance

Every three years within the workshop on the SM road. Bogies would be removed and DI's done separately to increase the throughput on that road. The SM task for the fleet will be extended out to give a constant throughput through the maintenance facility.

With the use of smart train approach/way side equipment monitors these wheel sets may be replaced on condition.

Locomotive Maintenance Tasks

Locomotive maintenance is time based with the scope of the services based on a prediction of the distance covered during that interval and the anticipated duty cycle for the class of locomotive.

Scheduled Services

Planned maintenance activities undertaken on a locomotive at a Locomotive Maintenance Facility at pre-determined intervals (typically 120 days) with the aim to maximise locomotive performance – locomotive availability and reliability. Maintenance activities include the checking of consumables such as brushes, filters. The interval is in calendar days and the duration is rounded to whole days.

Un-scheduled Maintenance

Maintenance undertaken on a locomotive that is not planned and caused through premature failure of a component and/or damage sustained during use.

Repairs may be required to be undertaken at the Locomotive Maintenance Facility or, dependant of the nature of the defect, undertaken within the field.

Un-scheduled maintenance is carried out as an adjunct of Schedule maintenance. Un-scheduled maintenance activities are initiated either through entries in the drivers log, requirements found during inspection in the scheduled service or through items logged onto the maintenance system by the help desk. Where an un-scheduled maintenance item cannot be completed, for instance if the required parts are not available at that time, then the item is not closed out on the sign off sheet. Those items that are not closed out will automatically be raised for attention at the next scheduled maintenance.

Wheel Profiling/Wheel Lathe Facility

The need exists to profile the locomotive wheels at regular intervals so as to maximise wheel life and to ensure wheel condition integrity. Wheel wear rate is based on the operational environment and typically undertaken every 100,000 kilometres. Wheels will be turned down in accordance with both manufacturers' recommendations and in line with a condition monitoring process.

Major Component Change Out Program

This is the planned overhaul of locomotive components undertaken at pre-determined intervals in order to sustain acceptable levels of locomotive performance.

Fragmented Component Change Out strategy targets individual components based on condition with the trigger criteria based on kilometres travelled, megawatt hours, or time. For example:-

- Turbo changes.
- Traction motors overhauls.
- Air compressor changes.
- Bogie overhauls.

Crew Changes

The site would be used for the changeover of train crew at each shift change.

There is no designated shift changeover. Train crews arrive and depart throughout the day in accordance with the locomotive timetabling.

Administration

Administration activities would be undertaken on site to allow the day to day running of Pacific National's activities. These administration activities would be concentrated within the administration facility, however, the locomotive and wagon facilities would also have small administration functions attached to them.

3.6.2 TRAIN AND VEHICLE MOVEMENTS

Modelling for the Project shows that in 2013 Pacific National expect to undertake 14 provisioning events per day at the Project. Each event is a train taking 1.5 hours to re-fuel and provision. This is based on 70% of Pacific National's provisioning events occurring at Greta and 30 Pacific National trains in the coal chain re-fuelling every 1.4 days. In 2020, PN expects to have approximately 42 trains in their network, accordingly by 2020 the number of provisioning events at the Project is expected to increase.

Vehicle movements associated with each stage are detailed in Section 8 of this report.

3.6.3 STAFF DETAILS

During Stage 1 activities, staff on site would comprise a mix of 'day staff' and 'shift workers'. Day staff would occupy the Project Monday to Friday generally between 7:00am and 6:00pm.

There would be up to 20 administration, technical and maintenance staff on site during these hours. All work on site would be undertaken out of office hours. There would be approximately five staff on site at any one time outside of normal office hours. Staff numbers are expected to increase progressively as site activities increase. By Stage 3 the number of staff on site during office hours is likely to increase to approximately 25-30, while the number of shift workers on site outside of normal office hours would be between 5-10.

The total staff numbers expected to utilise the facility for each Stage are detailed below however, it is important to note that these are spread over a 24 hour period and as such, not all staff would be present on site at any one point of time.

- Stage 1 - 24 staff.
- Stage 2 - 28 staff.
- Stage 3 - 38 staff.

3.7 **SERVICES AND UTILITIES**

3.7.1 **WATER AND SEWER**

Consultation has been undertaken with Hunter Water Corporation, as detailed in Section 6 of this report. HWC have estimated that the Project would place an additional peak demand of approximately 12.75kL/d on the water system and approximately 16ET on the wastewater system. HWC's comments regarding water delivery, waste water transportation and waste water treatment are summarised below.

Water Delivery

Two options were assessed by HWC for connection to the Maitland Water Supply system:-

1. DN200mm main along High Street, Greta (approximately 2.2 kilometres from the site to the north); and
2. DN150mm main in Mary Street, Greta (approximately 510 metres from the site to the south-east).

For Option 1, results of HWC's analysis indicate that there is sufficient capacity to supply the development under Peak Day Demands to meet the 20 metre minimum pressure required, and to supply the additional fire fighting demands of 20L/S, yet we would have to cross the railway and Anvil Creek.

For Option 2, HWC advise that there is sufficient capacity to supply the development under Peak Day Demands to meet the 20 metre minimum pressure required however, there is insufficient capacity supply the additional fire fighting demands of 20L/S.

Wastewater Transportation

The nearest existing sewer connection would be the Branxton WWPS approximately 1.2 kilometres from the development. Transferring flows to this WWPS is expected to be difficult due to reasons including, crossing of both the railway and creek.

Additionally, the Branxton 3 WWPS is currently at capacity (it is noted an upgrade is planned in the Forward Capital Works Program by 2012).

Wastewater Treatment

There is currently insufficient capacity at Branxton WWTW to cater for the additional load however, capacity will be available following completion of the Stage 3 upgrade scheduled for early 2011.

3.7.2 ELECTRICITY AND TELECOMMUNICATIONS

Consultation has been undertaken with Energy Australia, as detailed in Section 6 of this report. Consultation has revealed that there may be some capacity constraints at this point and upgrades may be required. This will be finalised during preparation of the detailed design for the site.

4 STRATEGIC AND PROJECT JUSTIFICATION

4.1 INTRODUCTION

The Director-General's Requirements require a strategic and project justification be provided within the Environmental Assessment as follows *"Strategically justify the project taking into consideration the objects of the Environmental Planning and Assessment Act 1979, the project's consistency with the aims and objectives of relevant State policies (State Plan, State Infrastructure Strategy) and the project objectives."* This chapter details the strategic and project justification including the strategic need for the Project, Pacific National's Project objectives, alternative options considered, and justifies the Project in relation to the relevant New South Wales State policies and plans.

4.2 STRATEGIC NEED

The NSW coal mining industry produced around 170.3 million tonnes (mt) of raw coal in 2006 - 2007, accounting for \$8.1 billion in income. The sector as of end of June 2007 directly employed 13,392 people in the coal field regions across New South Wales. In 2006 - 2007, exports from the Port of Newcastle increased to 91.5mt from 89.8mt the previous year exporting to 26 countries worldwide.

The Hunter Valley coal chain is the process by which coal is exported to these markets through the Port of Newcastle. The coal chain is comprised of the following participants:-

- Coal Producers.
- PWCS (Port Waratah Coal Services).
- NCIG (Newcastle Coal Infrastructure Group).
- ARTC (Australian Rail Track Corporation).
- Pacific National.
- QR National (Queensland Rail).
- Newcastle Port Corporation.

Pacific National currently hauls approximately 80mt of export coal to the Port of Newcastle accounting for approximately 85% of traffic. It can be deduced from this that Pacific National plays a vital role in the Hunter Valley coal chain.

To undertake this rail haulage task, Pacific National's Hunter Valley business employs 27 trains, comprising approximately 94 locomotives and 1,900 wagons. Fuelling and provisioning facilities, maintenance facilities, and train crewing and administration functions support this operation.

The export task through Newcastle Port is expected to grow to approximately 145mt per annum (mtpa) by 2011 and potentially to 211mtpa by 2015, an increase of approximately 129% on the current task.

The current system is considered constrained and one of the system capacity enhancement strategies discussed in the Australian Rail and Track Corporation's (ARTC) *Hunter Valley (Rail) Corridor Capacity Strategy* (2009) HVRCCS), identifies a requirement for alternative fuelling/provisioning locations to meet the increase in traffic required to achieve these targets. The Project would allow Pacific National to expand their services within the Hunter Valley to meet an objective to free up coal chain capacity in operating from the existing provisioning facilities at the Port end of the rail system.

4.3 PACIFIC NATIONAL'S PROJECT OBJECTIVES

The Director-General's Requirements state that the Project's objectives are to be detailed in the Environmental Assessment. The objectives of the Project are to:-

- Contribute to a freeing up of coal chain capacity in operating from the existing provisioning facilities at the Port end of the rail system.
- Ensure that Pacific National Trains can be stored, cleaned, inspected, serviced maintained, repaired and dispatched into service as necessary to meet the fleet availability requirements.
- Provide a safe and efficient working environment for staff.
- Minimise maintenance operating costs and down time for the materials.
- Minimise capital expenditure and life cycle maintenance costs.
- Have regard to the Principles of ESD.

4.4 ALTERNATIVE OPTIONS

A number of alternatives to the Project were considered, including expansion of existing provisioning facilities at Port Waratah and Kooragang Island as well as the consequences of doing nothing. These options, as described below were not achievable. As such, a new site was located based on the locational criteria discussed in Section 2.4. Once the subject site was selected, a number of design options were considered in order to maximise the use of the site while minimising potential environmental impacts.

In considering the development of the site, the final project design has been an iterative process providing different options that will not only serve Pacific National but also consider the environmental constraints of the site. Three options have been produced with the third option being the Project. The following is a discussion on the two previous proposals for the site and why changes to the design were proposed as a result of site assessment.

The following value improvement workshops were held to discuss these options and arrive at a final concept design for the Project:-

- Internal Signalling Workshop held 8 December 2009.
- ARTC Signalling Workshop held 8 December 2009.
- Operations Design Review held 10 December 2009.
- Maintenance Design Review held 15 December 2009.
- Internal User Requirements Workshop held 7 January 2010.
- Design Workshop held 13 January 2010.
- Greta Operations Strategy Workshop held 20 January 2010.
- Final Concept Design Review held 22 January 2010.
- Facility Safe Operations Risk Assessment held 1 March 2010.

4.4.1 EXPANSION OF EXISTING FACILITIES

Expansion of the existing provisioning facilities at Port Waratah and Kooragang Island was considered as part of the design process. This option was discounted as there is insufficient land available to construct additional facilities at these two locations. While some additional activities could be located within existing facilities, the servicing capacity would be far lower than what is achievable at a new site and as such would not meet the Project objectives. Further, the network configuration restricts increased activity at this point. As such, it was determined that expansion of the existing provisioning facilities at Kooragang Island and Port Waratah was not a viable option to gain an increase in the required servicing capacity.

4.4.2 DO NOTHING OPTION

The do nothing option was considered during the alternative options analysis. It was concluded that if the TSF facility was not constructed it would lead to network delays, disruptions and make it difficult to locate a place to provision and undertake maintenance on locomotives and wagons. The third track is currently being designed to allow increased capacity on the rail network. A new TSF facility is required to provide capacity for increased maintenance and re-fuelling as a result of this increased capacity on the wider network. The TSF would also provide an additional area to store locomotives. This option would have a detrimental impact on the rail network.

4.4.3 OPTION 1

Option 1 was submitted with the Preliminary Environmental Assessment which provided the following:-

- A vehicular access road into the site from Mansfield Street with the vehicular access running parallel to the F3 corridor on the western side of the site.
- Car park and administration centre at the southern end of the site located to allow visitors to the site to be directed to the administration centre.
- Four arrival roads with three of these providing provisioning for trains and the fourth being for scheduled maintenance.
- The fifth road provided access to locomotive and coal wagon maintenance centre, storage sidings, locomotive shunting areas and the proposed coal wagon storage siding, capable of holding up to 155 wagons.
- Number of internal roads providing access to the proposed administration centre, bulk diesel fuel storage and sand storage facilities.

Following detailed investigations on the site, in particular:-

- The location of endangered ecological communities on the site.
- The location of potential archaeological deposits.

- The location and quality of the Sawyers Gully watercourse through the site.

Option 1 was considered to not have the best environmental outcome for the site. This was as a result of:-

- A significant area of endangered ecological community would need to be cleared – approximately 41 hectares of the site would be impacted by Option 1.
- Significant earth works would need to occur particularly parallel to the proposed F3.
- The access road for vehicles would have a substantial impact on the potential archaeological deposits.
- The vehicular access road would have a significant impact on the Sawyers Gully vegetation, as the area proposed for crossing of the gully was in better ecological condition than the areas further downstream.

As a result of these findings, the design was amended to be more responsive to the environmental constraints found on site.

4.4.4 OPTION 2

The re-design of Option 1 provided Pacific National with an opportunity to review the needs of their facility and how it may best operate based on their expected demands. The amendments to Option 2 from Option 1 included:-

- Relocation of the vehicular access road into the site.
- The removal of proposed coal wagon to the storage siding.
- The relocation of internal access roads.
- The removal shunting locomotive storage and proposed turntable to produce the development footprint.
- The arrival roads, in particular, Arrival Road 5 were placed parallel to minimise the footprint of the development.
- The administration and car park area was moved to avoid Sawyers Gully while still providing the first point of contact for any visitors to the site.

Further studies were undertaken during the design of Option 2 to better understand the constraints of mine subsidence on the site.

Option 2 reduced the extent of clearing on the site when compared to Option 1 to approximately 18.5ha, and reduced the extent of earth works, particularly in relation to the coal wagon storage siding and vehicular access roads into the site parallel to the F3 freeway. Option 2 also avoided, as much as possible, the potential archaeological deposits located on site and provided a crossing of Sawyers Gully in a more disturbed area. In addition, the revised design provided better opportunities for the locomotives through the site, providing three provisioning roads and two scheduled service roads.

Option 2 represents a lesser impact to the site and the surrounding environment when compared to Option 1.

4.4.5 OPTION 3

Option 3 was developed from Option 2 and represents the Project being put forward for assessment in the final iteration in the options provided. The key amendments to Option 3 when compared to Option 2 are:-

- The administration facility has been relocated away from more potential archaeological deposits, out of the potential mine subsidence area and away from Sawyers Gully.
- The proposed additional crossing of Sawyers Gully for an internal access road was removed and the wagon maintenance facility moved further to the north to avoid the edge of the potential archaeological deposit, and to be further away from the residential properties at the southern end of the site. The internal vehicular access road was extended and the locomotive maintenance facilities relocated to provide small reductions in the development footprint.
- The shunting tracks proposed were moved further north away from Sawyers Gully, and the residents to the south of the site, also reducing the impact on the potential archaeological deposit on the northern side of Sawyers Gully. In addition, the shunting tracks were moved closer together to reduce their overall footprint.

- All facilities associated with the site including administration, maintenance and field storage are located centrally on the site away from the residential areas south of the site.
- The proposed crossing of Sawyers Gully has been located close to the existing vehicular crossing and the location of the control activity, approval was provided by the Department of Water for access to the site for geotechnical testing.

Option 3 represents the final design of the Project and is the subject of this environmental assessment. Option 3 provides the least environmental impact of the three options assessed and has led to some compromises in the location of facilities by Pacific National to ensure that impacts on the site and surrounding environment have been reduced.

These three options have been provided in the following three figures.

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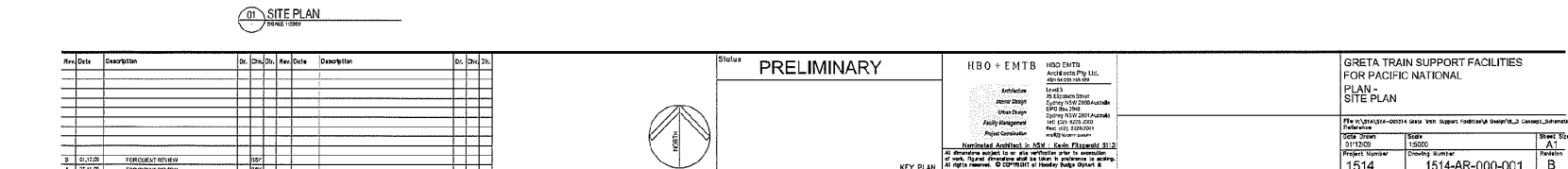


Figure 10 Option 3



4.4.6 **CONCLUSION**

The do nothing option was discounted due to severe network objectives. Further, the existing provisioning facilities have reached capacity and due to network and site constraints, are unable to be expanded. As such, it is considered necessary that a new TSF be constructed. The site selection and concept design process has led Pacific National to develop the Project as proposed. A number of Options were developed during the design phase with the final option, Option 3, representing the best outcome in terms of minimal disturbance to both the site and the surrounding locality.

4.5 **STRATEGIC JUSTIFICATION**

The Director-General's Requirements state that justification of the Project taking into consideration the objects of the *Environmental Planning and Assessment Act 1979* and the Project's consistency with the aims and objectives of relevant state policies (State Plan, State Infrastructure Strategy and Lower Hunter Regional Strategy) is required. The following text details this justification.

4.5.1 **OBJECTS OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979**

In accordance with the Director-General's Requirements, consideration has been given to the objects of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act 1979) as outlined below:-

- **To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.**

The Project would facilitate the proper management and development of natural resources, particularly coal, by improving the efficiency of the coal transportation system within the Hunter Valley. The Project location was selected due to accessibility to the rail and road network.

The Project has been developed to minimise impacts to local biodiversity and ecological integrity. Where impacts would be imposed, mitigation measures have been developed in the concept design to reduce the scale and intensity of those impacts.

- **To encourage the promotion and co-ordination of the orderly and economic use and development of land.**

The development of improved infrastructure for the movement of coal would assist with the orderly use and development of land in the locality. The Project would not significantly affect the future orderly use or development of land. Despite the site's current rural zoning, it is considered that rural opportunities on the site are limited due to the proximity of the site to the Main Northern Railway and the proposed Hunter Expressway. A TSF is considered to be an appropriate economic use for the development of the subject site to assist in the movement of coal and other freight within the Hunter Valley.

- **To encourage the provision of land for public purposes.**

There would be no loss of public land as a result of the Project. The Project would help improve rail infrastructure within the Region which would free up existing constrained infrastructure. This would benefit the wider community, including public transport commuters on the Main Northern Railway. The Project is likely to result in the provision of land for conservation purposes through the provision of off-sets to mitigate the impact of clearing of native vegetation on the subject site.

- **To encourage the provision and co-ordination of community services and facilities.**

The Project would not impact on the provision of existing community services and facilities and would not directly provide any additional community services or facilities. As discussed above, the wider community would benefit from the Project. Additionally, any developer contributions payable for the Project would be made available for public use.

- **To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.**

The concept design of the Project was developed with the inclusion of environmental mitigation measures and to respond to the site constraints. The final design has been selected following field work and represents the best environmental outcome on the site.

- **To encourage ecologically sustainable development.**

Australia's National Strategy for Ecologically Sustainable Development 1992 (NSED) defines ecologically sustainable development (ESD) as *'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased'*.

Three principles that are necessary to understanding sustainable development are intergenerational equity, the precautionary approach and biodiversity conservation. These are discussed below.

The Precautionary Approach

This principle states that if there are threats of serious or irreversible environmental damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

The precautionary principle has played a key role in the development of the Project.

As part of the design options identification process an assessment of the environmental impact of various options was undertaken.

A number of specialist studies have been undertaken for the Project to identify potential impacts. Where impacts have been identified, mitigation measures have been proposed to minimise any potential impact.

These mitigation measures are reflected in the draft Statement of Commitments (SOC) contained in this report in Section 18. The Project would not result in any impacts of serious or irreversible damage.

Intergenerational Equity

This principle states that the current generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. By developing and improving the economic conditions in the area, the Project would enhance productivity for future generations. The Project would have long-term benefits and is supported and encouraged by the NSW State Plan and the State Infrastructure Strategy, as discussed below.

Biodiversity Conservation

This principle requires that the diversity of genes, species, populations and communities, as well as ecosystems and habitats to which they belong, must be maintained and improved to enable their survival. The final design and site layout was selected in preference to other options as it has a comparatively lower ecological impact, with a lesser extent of native vegetation to be removed. The vegetation on site is already fragmented due to the proximity of the Main Northern Railway and the proposed Hunter Expressway. Where impacts on biodiversity are likely to result from the Project, mitigation measures have been developed to reduce the scale and intensity of those impacts. This will assist in maintaining biological diversity.

- **To encourage the provision and maintenance of affordable housing.**

The Project is for industry and infrastructure purposes and would not have any impact on the provision or maintenance of affordable housing.

- **To promote the sharing of the responsibility for environmental planning between the different levels of government in the State.**

The Project is to be assessed under Part 3A of the *Environmental Planning and Administration Act 1979* (EP&A) Act and would follow the legislated consultation requirements under this Part of the EP&A Act. The relevant NSW Government departments and agencies were consulted at the time of the lodgement of the Project Application and their input was reflected in the DGR's. An application has been submitted to the Federal Department of Environment, Water, Heritage and the Arts to determine whether the Project constitutes a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Cessnock Council has also been involved in the Project.

- **To provide increased opportunity for public involvement and participation in environmental planning and assessment.**

Pacific National has undertaken consultation activities to inform and receive feedback from relevant stakeholders and government agencies of the progress of the Project. These activities are listed in detail in Section 6 of this report. In addition to this pre-lodgement consultation, the Environmental Assessment would be placed on public exhibition by the NSW Department of Planning for a minimum of 30 days. In accordance with the requirements of the EP&A Act, stakeholders and the public are invited to make submissions. This process provides opportunity for public involvement and participation in environmental planning and assessment of the Project.

4.5.2 NSW STATE PLAN

The DGR's state that justification of the Project's consistency with the aims and objectives of the *NSW State Plan, a New Direction for NSW* (NSW State Plan) is required. The NSW State Plan contains a set of goals that the NSW Government seeks to work towards. It also identifies priorities for Government action that would help achieve these goals.

The Project would help support coal carrying activities along the network thereby assisting in rail transportation of coal to the Port of Newcastle. This would help strengthen the NSW economy and help facilitate a reliable coal transport system.

As detailed below, the Project would help deliver the following priorities of the Plan:-

- Maintain and Invest in Infrastructure.
- Increase Business Investment and Support Jobs.
- Protect Our Native Vegetation, Biodiversity, Land, Rivers and Coastal Waterways.
- Improve Air Quality.
- Reduce Waste.
- Increase the number of Jobs Closer to Home.

Maintain and Invest in Infrastructure

The NSW State Plan reports that over the next four years, the NSW State Government are investing \$65.5 billion in infrastructure, the largest program of any State Government in Australia. This investment in transport, schools, hospitals and housing will support up to 165,000 jobs every year, and will equip NSW with the infrastructure to support growth. The Project would support and complement the NSW State Government's delivery of infrastructure. The Project would result in significant investment to rail infrastructure, and would help support coal carrying efficiency of the network. The Project is well timed in the context of other rail projects within the region including ARTC's third track and the new coal loader currently being constructed.

Increased Business Investment

The NSW State Plan recognises business investment in NSW continues to grow, increasing during the last financial year to \$47 billion despite the economic downturn. The NSW State Plan details that the NSW Government is working to grow investment by maximising the employment and productivity in sectors where NSW has a competitive advantage.

The Project would result in a significant investment in rail infrastructure within the Hunter Region to support NSW's growing economy by Pacific National. The construction phase of the Project would create opportunity for local businesses to supply services, labour and goods.

Protect Our Native Vegetation, Biodiversity, Land, Rivers and Coastal Waterways

The NSW State Plan sets goals to meet NSW Statewide targets for natural resource management to improve biodiversity and native vegetation, sensitive riverine and coastal ecosystems, soil condition and socio-economic wellbeing. A number of actions are identified within the document to meet this goal including, but not limited to:-

- Increase the extent and improve the condition of native vegetation and habitats.
- Continue to build a Comprehensive, Adequate and Representative reserve system, based on national parks and reserves as the core biodiversity conservation mechanism, as well as other public and private land conservation.
- Manage fires, weeds and pest species.
- Introduce a new *NSW Biodiversity Strategy* to protect threatened native species and ecosystems and address the impacts of climate change.
- Increase community awareness of the importance of soil health and share best practice land management techniques.
- Provide greater opportunities for Aboriginal people to take part in management of Country, including joint management of national parks.

These actions have been taken into account during the concept design phase of the Project. The Project would result in some loss of native vegetation on site through land clearing, however, mitigation measures have been proposed to offset any potential environmental impacts. The Project would provide land for conservation measures thereby ensuring that there would be no significant impacts on native vegetation or biodiversity. This is discussed further in Section 7.

Improve Air Quality

The NSW State Plan recognises that air quality in NSW has improved considerably in the last decade, however, it notes that there is still room for improvement.

The following actions are identified to help improve air quality that are relevant to the Project:-

- Cutting emissions from products such as coatings and adhesives, and equipment such as leaf blowers, lawn mowers and outboard motors via tougher national standards.
- Better managing industrial emissions with an updated *Clean Air Regulation* for ozone-forming substances from new and existing industrial sources.

An Air Quality assessment has been undertaken for the Project to assess the impact of the Project on air quality. The Project would use appropriate coatings, adhesives and equipments to minimise any impact. The assessment concluded that the Project would not have any unreasonable impacts on air quality within the locality. Accordingly, it is considered that the Project is compliant with the NSW State Plan's actions for air quality.

Reduce Waste

The NSW State Plan recognises that the NSW Government is committed to achieving its long standing recycling targets by 2014. Although there are no specific actions within the NSW State Plan that are relevant to the Project, it is important to note that a Waste Management Plan would be prepared for the construction and operation of the Project to reduce waste generated on site and allow for recycling where possible.

Increase the Number of Jobs Closer to Home

The NSW State Plan recognises that jobs closer to home means less time spent travelling.

Although the immediate efforts identified in the NSW State Plan are focused on Metropolitan Sydney, the Project would result in a significant provision of jobs within the local community, close to the existing township which meets the intent of this priority.

Hunter Local Action Plan

The Hunter Local Action Plan (HLAP) was released in response to community consultation undertaken for the NSW State Plan. The HLAP identified five key priorities for action.

Those that are relevant to the Project include:-

- i. Diversify the Hunter Economy.
- ii. Invest in and Maintain Public Infrastructure.

The Project is not listed within the H LAP as a priority, however, it would provide additional jobs and would comprise a significant investment in infrastructure. As such, the Project meets the intent of the H LAP.

4.5.3 NSW STATE INFRASTRUCTURE STRATEGY

The NSW State Infrastructure Strategy (The Strategy) is a rolling 10 year plan for infrastructure projects to support service delivery within NSW. The current Strategy was first published in 2006 and is updated every two years. The Strategy covers the State's expenditure on capital assets over the next decade and sets out the strategy to manage public investment growth in line with funding sources. The Strategy maps infrastructure projects by six broad regions, including the Hunter.

The Strategy recognises that demand for infrastructure would remain at high levels over the next decade and is driven by population growth, ageing and longevity, technological change, industrial and commercial developments, cost pressure, infrastructure renewal and environmental issues. This is especially relevant to the Hunter Region.

Although the Strategy does not specifically identify any Pacific National Projects, it does recognise that the volume of freight requiring transportation would continue to increase. Further, the Strategy identifies the Newcastle Port re-development as a key part of the Hunter Infrastructure Strategy. The mid year budget review is linked to the Strategy. It is noted that the mid year budget review provided additional funds for certain rail projects within the region. The Project would provide an additional re-fuelling and maintenance facility within the region to free up congestion at existing facilities at the port end of the Network, which would help cater for future coal transportation demands and would help deliver an increased supply of coal to the Port of Newcastle.

Accordingly, it is considered that the Project is consistent with the Strategy, as it assists in managing the delivery of appropriate infrastructure for the State.

4.5.4 LOWER HUNTER REGIONAL STRATEGY

The Lower Hunter Regional Strategy (LHRS) recognises that the Hunter Region accounts for 14% of Australia's total exports, and of those exports, coal being the significant majority. It also states that Newcastle is the world's largest coal exporting port, and that projected economic activity in the Lower Hunter is recognised as providing a significant number of new industries and work force that will substantially drive economic growth in New South Wales. The LHRS is discussed in detail in Section 5.7 of this report.

The LHRS recognises that industrial land will remain important to the regional economy as the region capitalises on the opportunity presented by its geographical location, existing infrastructure and skills base. As discussed in Section 5.7 of this report, the Project is consistent with the aims and objectives of the LHRS as it would provide additional employment lands in a well located site within the region.

5 STATUTORY AND PLANNING FRAMEWORK

5.1 INTRODUCTION

The DGR's issued for the Project requires that a description of the planning context be undertaken in the Environmental Assessment for the Project. The following chapter provides description of the planning framework including Commonwealth, State and local requirements relevant to the Project.

5.2 ASSESSMENT AND APPROVAL PROCESS

The Project is being undertaken pursuant to Part 3A of the *Environmental Planning and Assessment Act* 1979 (EP&A Act). Part 3A of the *EP&A Act* provides a streamlined and integrated development assessment and approvals regime for major infrastructure and other Projects of significance to the State that need the approval of the Minister for Planning. Part 3A applies to certain types of Projects declared by the Minister as outlined in the *State Environmental Planning Policy (Major Projects) 2005*.

As detailed in correspondence dated 10 February 2009, the Director-General of the DOP has formed the opinion that the Project is development of a kind that is described in Schedule 1 of the *State Environmental Planning Policy (Major Projects) 2005*, namely Clause 23. Accordingly, the Director-General has declared that the Project is a Major Project under Part 3A of the EP&A Act. Under Part 3A of the EP&A Act, an Environmental Assessment is required to be prepared and submitted with an application for approval to the NSW DOP.

5.2.1 APPROVALS AND OTHER LEGISLATION

It is noted that Section 75U of the EP&A Act outlines approvals and legislation that do not apply when a Project is assessed under Part 3A. Section 75V of the EP&A Act outlines approvals and legislation that still apply when a Project is assessed under Part 3A. These are:-

- An aquaculture permit under Section 144 of the *Fisheries Management Act 1994*.

- An approval under Section 15 of the *Mine Subsidence Compensation Act 1961*.
- A mining lease under the *Mining Act 1992*.
- A production lease under the *Petroleum (Onshore) Act 1991*.
- An environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in Section 43 of that Act).
- A consent under Section 138 of the *Roads Act 1993*.
- A licence under the *Pipelines Act 1967*.

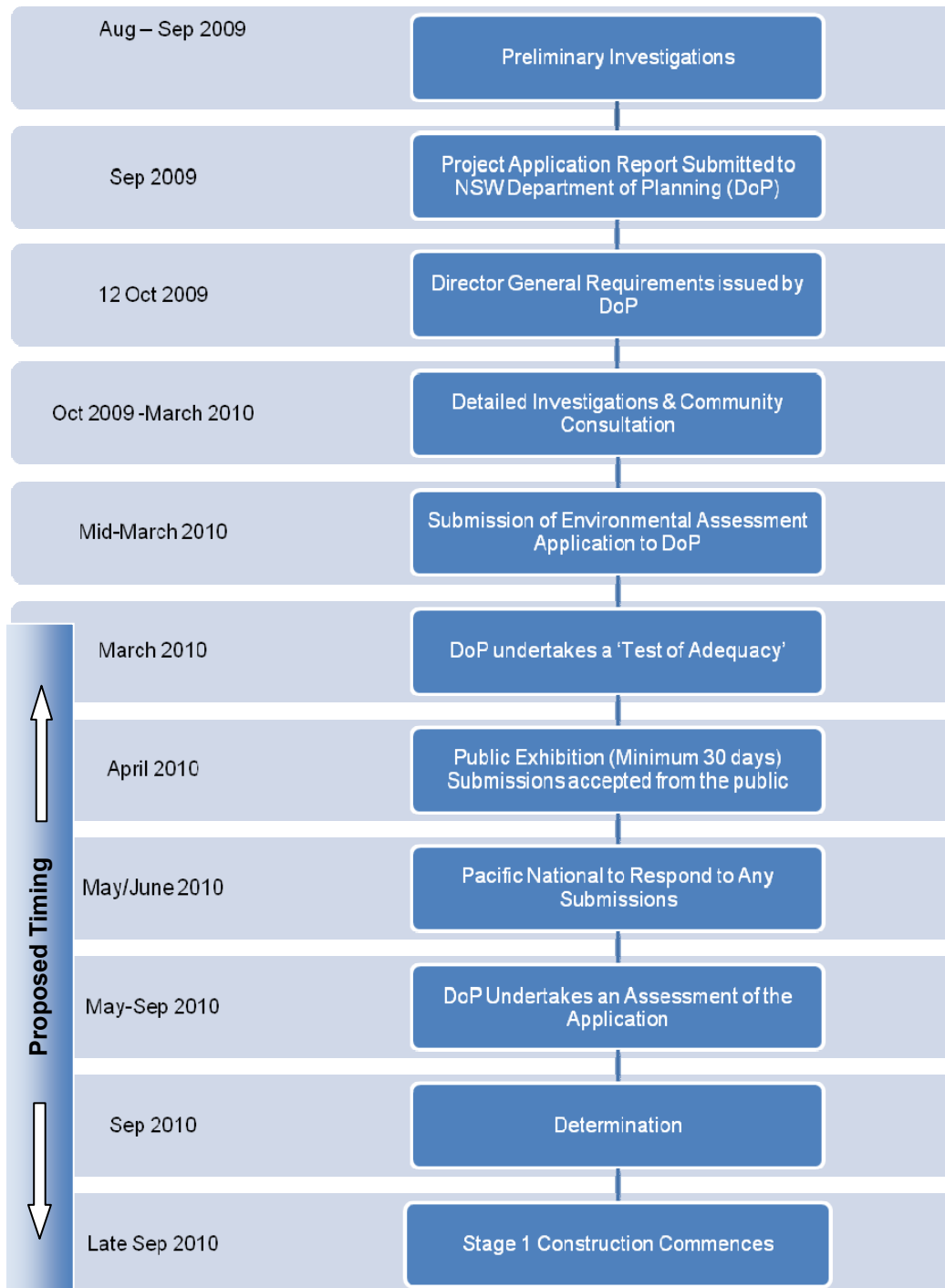
Notwithstanding the exemptions granted under Section 75U of the EP&A Act, the DGR's were prepared to take into consideration the aims and objectives of the abovementioned Acts. A number of specialist studies have been prepared for the Project to address these issues and assess the potential impacts of the Project.

A summary of the assessment and approval process under Part 3A of the EP&A Act is provided in Section 5.3.

5.3 ASSESSMENT PROCESS

The assessment process for the Project is detailed in the following figure.

Figure 11 Overview of Approval Process and Timing



5.3.1 THE PROJECT APPLICATION REPORT

The Project Application Report to undertake the Project under Part 3A of the EP&A Act was lodged with the NSW Department of Planning on 1 October 2009, pursuant to Section 75E of the EP&A Act. The purpose of the project application was to apply for Project approval from the Minister for Planning to carry out the described Project under Part 3A of the EP&A Act.

5.3.2 DIRECTOR-GENERAL'S REQUIREMENTS

Under Clause 75F of the EP&A Act, the Director-General of Planning is required to prepare and issue the proponent with DGR's for undertaking the Environmental Assessment. A Planning focus meeting was held on 23 September 2009, to inform the preparation of the DGR's. The DGR's identify key issues to be addressed and the level of assessment required. Pacific National received the DGR's for the Project's Environmental Assessment on 12 October 2009.

5.3.3 PREPARATION OF THE ENVIRONMENTAL ASSESSMENT

This Environmental Assessment has been prepared in accordance with the DGR's and Part 3A of the EP&A Act, and addresses the relevant statutory and non-statutory requirements in order for Pacific National to seek Project Approval from the NSW Minister for Planning for the Project. The Environmental Assessment addresses the general requirements and key issues contained within the DGR's. The Environmental Assessment also identifies the potential impacts associated with the Project, proposes environmental mitigation measures to reduce any impact, and discusses any residual risks that may be present following implementation of mitigation measures. The environmental mitigation measures identified in this Environmental Assessment have been collated in the draft Statement of Commitments, which is contained in Chapter 18.

5.3.4 EXHIBITION

If the DOP considers that the Environmental Assessment meets the DGR's, then it would be placed on public exhibition for at least 30 days. During the exhibition period, submissions would be invited from relevant agencies and members of the public.

The DOP would provide Pacific National with a copy of the submissions or a summary of the issues raised in the submissions. Pacific National would be asked to respond to the issues and may modify the Project and the draft Statement of Commitments to minimise impacts on the environment if required. If the Project or the draft Statement of Commitments is modified in response to issues raised, a Preferred Project Report would be prepared to describe the scope of the revised Project. The DOP would make this report available to the public.

5.3.5 ASSESSMENT AND DETERMINATION

Following the exhibition period, the DOP would, on behalf of the Minister, review and assess the Environmental Assessment, any submissions received and any preferred Project Report. Once the DOP has completed its assessment, a draft assessment report would be prepared for the Director-General, which may include recommended conditions of approval. The recommended conditions would refer to the draft Statement of Commitments and may modify them and/or add additional provisions. The assessment report would then be submitted to the Minister for Planning for determination. The Minister may refuse the Project, or approve it with any conditions considered appropriate. The Minister's determination and the Director-General's report would be published on the DOP's website immediately following determination and provided to Pacific National.

The following text describes the Commonwealth, State and Local statutory planning framework which applies to the Project, and discusses the strategic policies which are relevant to the Project.

The *Commonwealth Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Federal Department of Environment, Water, Heritage and the Arts (DEWHA). The aims of the *EPBC Act* are:-

- *Provide for the protection of the environment, especially matters of national environmental significance.*
- *Conserve Australian biodiversity.*
- *Enhance the protection and management of important natural and cultural places.*
- *Control the international movement of plants and animals (wildlife), wildlife specimens and products made or derived from wildlife.*
- *Promote ecological sustainable development through the conservation and ecologically sustainable use of natural resources.*

The EPBC Act requires the Federal Environment Minister's approval for an action that will, or is likely to, have a detrimental or adverse impact on a matter of National Environmental Significance (NES) or on Commonwealth land, unless the action is exempt. Under the EPBC Act, actions that are likely to have a significant impact on a matter of NES are subject to a rigorous referral, assessment, and approval process. An 'action' includes a project, development, undertaking, activity, or series of activities.

Matters of NES currently include World Heritage properties, Ramsar wetlands, nationally threatened species and ecological communities, migratory species, Commonwealth marine areas, nuclear actions and national heritage places.

A search was undertaken of the national database. This search confirmed that there may be matters on or near the site that are either of national significance or other matters protected by the EPBC Act.

An EPBC Act referral was forwarded to DEWHA in November 2009 for consideration and was received by DEWHA on 15 December 2009. In correspondence dated 15 January 2010, DEWHA determined that the proposed action is a controlled action as it is likely to have a significant impact on threatened species and Ecological Communities (s18 and s18A).

The title of the Controlled Action is 'Pacific National Train Support Facility, Greta, NSW – EPBC 2009/5243'.

It was found that the proposed action is likely to have a significant impact on Threatened Species and Ecological Communities as it involves the clearing of up to 50 hectares of native vegetation that is classified as critical foraging habitat for the Grey-headed Flying-fox, and important habitat for the Regent Honey Eater. Consequently, the Project would require assessment and approval under the EPBC Act before it could proceed. The DOP would undertake this assessment on behalf of DEWHA under an accredited assessment. The DOP issued supplementary DGR's on 24 February 2010, in response to the DEWHA's correspondence. As discussed in Section 7, both these species were identified in desktop reviews as potentially occurring on site, however, no records of them were found during field work.

5.5 STATE STATUTORY PLANNING FRAMEWORK

The following text details the State statutory planning framework including State Environmental Planning Policies (SEPPs) and other relevant NSW Legislation.

5.5.1 STATE ENVIRONMENTAL PLANNING POLICIES

A review of all *State Environmental Planning Policies* (SEPPs) reveals that the following are of particular relevance to the Project.

State Environmental Planning Policy (Major Projects) 2005

This policy identifies the type of development that will be subject to Part 3A of the EP&A Act. The Department provided a Clause 6 opinion on 12 October 2009, which concluded that the proposal would be assessed under Part 3A of the EP&A Act. This opinion was based on the criteria for projects identified in Schedule 1 of the Policy, in particular, Clause 23 - rail and related transport facilities. As such, the Project is to be assessed under Part 3A of the EP&A Act and submitted for approval by the Minister for Planning.

State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (SEPP Infrastructure) was designed to assist in the delivery of significant infrastructure, particularly where it was provided by a public authority.

This policy is relevant to railways and railway related infrastructure. In relation to this class of development, specified zones trigger SEPP Infrastructure to allow application for that site and development type.

The current 1(a) Rural 'A' zone of the land under the existing Cessnock LEP is not equivalent to a prescribed zone listed in Clause 78 of SEPP Infrastructure.

For the purposes of SEPP Infrastructure, in accordance with the definitions contained within Clause 78, the site is declared to be the rail corridor as it is land in respect of which the Minister has granted approval under Part 3A or the EP&A Act, for the carrying out of development for the purpose of rail infrastructure facilities.

The Project would result in earthworks, including excavation. As such, Clause 86 of SEPP Infrastructure is applicable in this instance. Clause 86 applies to development that involves the penetration of ground to a depth of at least 2 metres below ground level (existing) on land within a rail corridor, or within 25 metres (measured horizontally) of a rail corridor. Before determining a development application for development to which this clause applies, the consent authority must give written notice of the application to the Chief Executive Officer of the rail authority for the rail corridor, and take into consideration any response to the notice that is received within 21 days after the notice is given, as well as any guidelines issued by the Director-General for the purposes of this clause and published in the Gazette. The consent authority must not grant consent to development to which Clause 86 applies without the concurrence of the Chief Executive Officer of the rail authority, for the rail corridor to which the development application relates, unless that rail authority is the Australian Rail Track Corporation (ARTC). In this instance the rail authority for the rail corridor is ARTC. ARTC have been consulted during the concept design phase of the Project and further consultation would be undertaken during the exhibition period and development of the detailed design.

The Project would not trigger traffic generating development as detailed within Schedule 2 of SEPP Infrastructure. The development would not have a car parking capacity of 200 or more vehicles.

State Environmental Planning Policy 33 – Hazardous and Offensive Development

This policy regulates the storage of, among other materials, fuel on a development site. The Project will require the storage of fuel and oil on site for the servicing of trains. This will require daily delivery of fuel to the site and the transfer to tanks maintained on site.

As a result the delivery, transfer and storage of fuel on site the Project would be considered a potentially hazardous development if no measures were taken to mitigate the ecological or personal risks on site as a result of fuel storage.

A Hazardous Materials Assessment Report has been prepared for the development to determine the measures required to mitigate the risk. This is discussed in Section 10 within this report.

State Environmental Planning Policy 44 – Koala Habitat Protection

State Environmental Planning Policy 44 (SEPP 44) aims to identify and protect koala habitat in New South Wales. This policy identifies the Cessnock Local Government Area as needing to adhere to the policy requirements, however, the Project is not subject to a development application and therefore, a formal assessment under SEPP 44 is not required for a Part 3A assessment under the EP&A Act. Notwithstanding, an assessment has been undertaken and the SEPP 44 survey approach used to identify the value and significance of the habitat on site for koalas. This has been done and is discussed in Section 7 within this report.

State Environmental Planning Policy 55 – Remediation of Land

The previous use on the site appears to be related to underground mining activities and more recently agricultural uses. However, the prior land owner believed there had been some structures on the site in the past. Evidence on the site of bricks and other building materials support these claims. The past uses on the site do not suggest that the site would contain any contamination that would restrict the proposed use.

As detailed within the draft Statement of Commitments in Section 18, A Waste Management Plan (WMP) would be prepared for classification of the building materials on site, primarily due to their age, to facilitate appropriate disposal of the material.

To meet the requirements of SEPP 55, a Phase 1 Contamination Report has been undertaken as part of the Environmental Assessment and is discussed in detail in Section 12 within this report. The Preliminary Contamination Report prepared for the Project found that the potential contaminants on site are considered minor and unlikely to result in adverse environmental impact.

State Environmental Planning Policy (Rural Lands) 2009

The aim of SEPP (Rural Lands) is to facilitate the orderly and economic use and development of rural lands for rural and related purposes. Part 2 of SEPP (Rural Lands) identifies rural planning principles to be considered. The Project is located on land zoned 1(a) Rural 'A' pursuant to Cessnock LEP. The rural planning principles contained within SEPP (Rural Lands) encourage the protection and promotion of opportunities for productive and sustainable economic activities in rural areas. The SEPP (Rural Lands) also identifies that in planning for rural lands, the social, economic and environmental interests of the community are to be balanced.

The Project would result in the loss of some land that is zoned for rural purposes. However, the land is sited between two significant infrastructure corridors being the main Northern Railway and the planned Hunter Expressway. As such, its application for rural use would be limited due to the proximity of these infrastructure corridors.

Overall, it is considered that the Project would result in an outcome where by the social, economic and environmental interests are balanced. As such, the Project is appropriate for the site in which it is located, and does not raise any issues that conflict with SEPP Rural Lands.

5.5.2 OTHER NSW LEGISLATION

As detailed above, Section 75U of the EP&A Act outlines approvals and legislation that do not apply when a Project is assessed under Part 3A. The following provides an assessment of the Project against the relevant NSW legislation that is applicable to the Project.

Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) provides for the issue of an Environment Protection Licence (EPL) pursuant to Section 48 of the POEO Act, for scheduled activities (being activities listed in Schedule 1 of the Act), in addition to the management of water, air and noise pollution and the control of wastes.

Activities relating to Railways Systems Activities are identified under Clause 33 of Schedule 1 – Scheduled Activities under the POEO Act. The Project is not classified as any of the activities listed.

Additionally, the mitigation measures outlined in the draft Statement of Commitments (Section 18) would be implemented to minimise the potential of the Project to result in pollution of the environment.

Roads Act 1993

The *Roads Act 1993* (Roads Act) regulates a range of activities undertaken on public roads. Approval is generally required under Section 138 of the Roads Act for works within a public road. Section 138 of the Roads Act requires that a person obtain the consent of the appropriate roads authority for the erection of a structure, or the carrying out of work in, on or over a public road, or the digging up or disturbance of the surface of a public road. Approval from Cessnock Council would be required under Section 138 of the Roads Act for works within Mansfield Street. A Traffic Impact Assessment has been prepared for the Project and is discussed in Section 8 of this report. It is not considered that any upgrades to Nelson Street or the New England Highway are required as a result of this Project.

Water Act 1912

The *Water Act 1912* (Water Act) facilitates development and use of water by controlling the extraction of water, the use of water, the construction of works, such as dams and weirs and the carrying out of activities in or near sources in NSW.

As discussed in Section 12 of this report, the Project is not expected to intercept groundwater during construction therefore a licence under Part 5, Section 112 of the Water Act and approval for these works would not be required. No groundwater would be used as a water sources for construction.

Noxious Weeds Act 1993

The objectives of the *Noxious Weeds Act 1993* (NW Act) are to reduce the negative impact of weeds on the economy, community and environment of this State by establishing control mechanisms, and to provide for the monitoring of and reporting on the effectiveness of the management of weeds in this State. Mitigation measures have been contained within the draft Statement of Commitments for the Project to manage the risk of noxious weeds on site. Details of these measures are contained in Section 18 of this Report.

Contaminated Land Management Act 1997

The *Contaminated Land Management Act 1997* (CLM Act) details the requirements for investigation and remediation of contaminated land. The CLM Act identifies the role of the NSW DECCW and local Councils in the management of contaminated land and details responsibilities for managing contaminated land. The Preliminary Contamination Report prepared for the Project concluded that the site is considered to be suitable for the proposed use from a contamination perspective. The identified potential contaminants located on site are considered minor and unlikely to result in adverse environmental impact. An online search of the NSW DECCW public register indicates that the site has no statutory licences, applications or notices issued under the CLM Act.

Transport Administration Act 1988

The *Transport Administration Act 1988* (TA Act) regulates the administration of transport activities undertaken within NSW. Part 8A of the TA Act requires approval from ARTC prior to Pacific National connecting to the NSW Rail Network. This would be undertaken as a separate process.

5.6 LOCAL ENVIRONMENTAL PLANNING FRAMEWORK

5.6.1 CESSNOCK LOCAL ENVIRONMENTAL PLAN 1989

The Cessnock Local Environmental Plan 1989 (Cessnock LEP) applies to the subject site. Currently, the site is zoned 1(a) Rural 'A' zone pursuant to the Cessnock Local Environmental Plan 1989.

Objectives

The objectives of the 1(a) Rural 'A' zone are:-

- (a) *To enable the continuation of existing forms of agricultural land use and occupation.*
- (b) *To ensure that potentially productive land is not withdrawn from production.*
- (c) *To encourage new forms of agricultural land use.*
- (d) *To enable other forms of development which are associated with rural activity and which require an isolated location, or which support tourism and recreation.*
- (e) *To ensure that the type and intensity of development is appropriate in relation to:-*
 - (i) *The rural capability and suitability of the land.*
 - (ii) *The preservation of the agricultural, mineral and extractive production potential of the land.*
 - (iii) *The rural environment (including scenic resources).*
 - (iv) *The costs of providing public services and amenities.*

5.6.2 PERMISSIBILITY

Within the 1(a) Rural 'A' zone, the following land uses are permissible without consent:-

Agriculture (other than animal boarding, breeding or training establishments, pig keeping establishments, feed lots or poultry farming establishments), commercial vineyards, forestry, stables.

Within the 1(a) Rural 'A' zone, the following land uses are permissible with consent.

Any purpose other than a purpose included in Item 2 or 4.

Within the 1(a) Rural 'A' zone, the following land uses are prohibited:-

“Advertising structures, amusement parks, automotive uses, boarding houses, bulk stores (other than those associated with an agricultural use), commercial premises (other than those primarily intended to provide services to tourists), heliports, industries (other than home industries or rural industries), junk yards, liquid fuel depots, mortuary chapels, motor showrooms, multiple dwellings, recreation facilities (other than those ancillary or related to a tourist recreation facility), residential flat buildings, shops (other than those primarily intended to provide services to tourists or general stores), transport terminals (other than the storage and servicing of vehicles associated with the occupation of the owner), warehouses.”

Railway related development is not listed as prohibited within the current LEP. Furthermore, the Cessnock LEP makes use of the Environmental Planning and Assessment Model Provisions 1980 (the model provisions).

The model provisions state:-

“Nothing in the local environmental plan shall be construed as restricting or prohibiting or enabling the consent authority to restrict or prohibit:-

- (a) the carrying out of development of any description specified in Schedule 1.”*

Clause 1 of Schedule 1 of the model provisions states:-

- “1. The carrying out by persons carrying on railway undertakings on land comprised in their undertakings of:-*

- a. any development required in connection with the movement of traffic by rail, including the construction, reconstruction, alteration, maintenance and repair of ways, works and plant.”*

Under the current LEP the development is permissible due to the adoption of the model provisions.

5.6.3 **SPECIFIC CLAUSES**

The following specific clauses of the Cessnock LEP have been identified as potentially applicable to the Project. An assessment of compliance for each clause is also provided below.

Clause 10 – General Development Principles

Clause 10 specifies general development principles for determining any application for consent to carry out development within a number of zones, including the 1(a) Rural Zone. Despite its rural zoning it is important to note that the site is highly constrained by transport infrastructure, bounded by both the Main Northern Railway line and the proposed Hunter Expressway. Accordingly its land use options are limited and it is considered that rail infrastructure represent the best use of the site. The Project is compatible with the capability of the land and consistent with the character of the locality. All services and utilities would be made available to the site. Suitable measures would be in place to ensure that the Project does not result in soil erosion. The Project would generate some additional traffic movements within the locality, however, as discussed in Section 8, the impacts of this are not considered significant. The development would have a positive economic impact in the community (refer to Section 14) and would not create demands for the extension of services by Council. The Project would incorporate on site stormwater management, and suitable controls would be in place to ensure that the Project would not lead to any deterioration of water supply or water quality within the water catchment (refer Section 17). Some clearing on the site is proposed to accommodate the rail tracks, buildings, access road and ancillary site features, however, clearing has been minimised and a large portion of the site would be revegetated (refer to Section 7). Accordingly the Project is compliant with sub-clause 1(a). Sub-clause 1(c) identifies a number of principles with respect to buildings to be considered. The Project is consistent with these principles. In particular, the buildings have been sited and designed to be of an appropriate scale. All buildings on site would be below the tree line when viewed from any public place (refer to Section 15). Adequate separation distances have been provided between the buildings on site to soften the visual impact of the built form.

Building materials and finishes would be of natural tones. The Project does therefore, not raise any issues that conflict with clause 10 of the LEP.

Clause 20 – Clearing

Clause 20(5) specifies that a person shall not, without the consent of the Council, clear land (other than for the purposes of bushfire hazard reduction) within Zone No 1 (a), 1 (c) or 1 (c2) and which is identified as Class VII or Class VIII on the Rural Capability Map (RCM) prepared by the Soil Conservation Service as part of the Land Resources Study — City of Greater Cessnock 1982. The site is not identified as Class VII or Class VIII on the RCM. As such, Clause 20 is not applicable to the Project. Notwithstanding, consent is being sought for clearing of the site as part of construction activities for the Project.

Clause 31 - Flood Affected Land

Clause 31 provides controls for the development of land within a floodway. Although some minor flooding may occur in the southern portion of site associated with Sawyers Creek, the site is not within a floodway. Therefore, Clause 31 does not apply to the Project. Notwithstanding, the vehicle access bridge over Sawyers Creek would be constructed above the identified 1 in 100 year flood event level, and has been designed to withstand the effects of flooding.

Clause 32 - Land Subject to Bushfire Hazards

The subject site is identified as bushfire prone. Clause 32 specifies that the Council shall not grant consent to any development on land which is subject to bushfire hazards, until it has made an assessment of the nature and degree of the hazard, relative to the appropriate measures available to reduce the hazard and in accordance with Clause 32(d) in the case of a building:-

- (i) whether the building has been sited in a manner which reduces bushfire hazard, and*
- (ii) the necessity to require fireproof building materials.*

The consent authority is also to undertake and assessment of the following sub clauses:-

- (e) the means of access for fire fighting vehicles, and*
- (f) the means available to ensure that fire protection measures including fire radiation zones and hazard reduction are appropriately maintained.*

A Bushfire Threat Assessment Report has been prepared for the Project. A detailed discussion of the Bushfire Threat Assessment Report is included in Section 10 of this EA report.

The Bushfire Threat Assessment Report identifies mitigation measures to reduce the bushfire risk on the site and concludes that the Project is a suitable land use for the site. The Project has been designed to allow access for fire fighting vehicles and would include fire protection measures.

Clause 37 Development in the Vicinity of Items of the Environmental Heritage

Clause 37 specifies that the Council shall not grant consent to a development application to carry out development in the vicinity of an item of the environmental heritage, unless it has made an assessment of the effect which the carrying out of that development will have on the historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance of the item of the environmental heritage and its setting.

There are no listed heritage items on the site however the site is approximately 100 metres to the Greta Railway Station and Station Master's House, sited off Nelson Street, and approximately 200 metres to one of the structures within the Greta Bridges Group within Nelson Street, both of which are items of local heritage significance. The site is also adjacent to the Main Northern Railway which is listed in the Cessnock LEP as a local heritage item with landscape value. A Heritage Impact Statement (HIS) has been prepared for the Project and is discussed in Section 11 of this report. The HIS concludes that the Project would not have any unreasonable impact on existing heritage within the locality.

Clause 47 Development Within Mine Subsidence Districts

In determining whether to grant consent to development on land within a mine subsidence district, the Council must have regard to whether the proposed development is likely to conflict with the future extraction of coal, and whether the proposed development is under threat of subsidence.

The subject site is not within a mine subsidence district, however, previous underground mine workings have been located on site and mine subsidence has been recorded on site.

A Geotechnical Study has been undertaken for the proposed development in order to locate the buildings within an appropriate section of the site, not identified as a subsidence risk and develop a construction methodology.

The Geotechnical Study concludes that the site is suitable for the proposed development. Additionally, as detailed in Section 7 of this report, consultation has taken place with the Mine Subsidence Board.

Clause 55 Development Near Zone Boundaries

This Clause applies to land which is within 20 metres of a boundary between any two zones. It allows development to be carried out with consent on land for any purpose for which development may be carried out in the adjoining zone on the other side of the boundary. The proposed land use is permissible within the 1(a) Rural 'A' Zone and therefore Clause 55 is not applicable. There would be no development outside of the boundary of the subject site. The eastern boundary of the site is subject to acquisition by ARTC as part of the third rail track. The boundary has not yet been defined. As such, the area subject to acquisition and hence, the connection points to the main line, has been assessed as part of this Environmental Assessment.

Clause 42 Land Having Environmental Conservation Value

This Clause applies to land shown hatched on the map as being land of environmental conservation value. The subject site is not shown as being land of environmental conservation value. Clause 42 does not apply to the subject site.

5.6.4 DRAFT CESSNOCK LOCAL ENVIRONMENTAL PLAN 2009

It is noted that under Part 3A of the EP&A Act, there is no requirement to consider draft environmental planning instruments. The following has been included to provide a comprehensive assessment of the Project against the statutory planning framework only and to address public concerns. Cessnock Council is currently preparing a new LEP in accordance with the DOP's Template LEP.

The Draft LEP document was publicly exhibited from Monday 27 July 2009 to Monday 12 October 2009, along with the Draft Cessnock City Wide Settlement Strategy, the Cessnock Development Control Plan 2009 (DCP 2009), and 11 Spot Rezoning. The exhibition period was later extended until 11 December 2009.

Under the draft LEP, the site was originally identified as RU2 'Rural Landscape'. Under the Template LEP, the Project is not permissible on the site. This issue has arisen as the template LEP does not adopt the model provisions. A submission was made to Council in response to the Draft LEP regarding the zoning of the site to a more appropriate zone, such as SP2 Infrastructure (Rail). Council considered this submission and amended the draft LEP accordingly. The revised Draft LEP was re-exhibited ended 4 August 2010.

5.7 STRATEGIC PLANNING FRAMEWORK

The following text details the strategic planning framework applicable to the project including the Lower Hunter Regional Strategy (LHRS), the Lower Hunter Regional Conservation Plan (LHRCP) and the Cessnock City Wide Settlement Strategy (CWSS).

5.7.1 LOWER HUNTER REGIONAL STRATEGY

The LHRS recognises that the Hunter Region accounts for 14% of Australia's total exports and of those exports, coal being the significant majority. It also states that Newcastle is the world's largest coal exporting port, and that projected economic activity in the Lower Hunter is recognised as providing a significant number of new industries and work force that will substantially drive economic growth in New South Wales.

The Strategy realises that emerging sectors such as health, education, financial and personal services as well as tourism, will generate new jobs for the region, however, it also recognises that traditional industrial land will remain important to the regional economy as the region capitalises on the opportunity presented by its geographical location, existing infrastructure and skills base.

Ensuring that ongoing capacity is provided for both new and traditional job opportunities for the growing population is an important focus of the regional strategy.

The Strategy identifies the economic challenges for the region as:-

- *Maximising the economic opportunities associated with the region's competitive advantages, in particular its economic infrastructure and specialised centres.*
- *Ensuring sufficient employment lands are available in appropriate locations to provide sufficient capacity to accommodate growth in existing and emerging industries.*
- *Maintain or improve the employment self-sufficiency of the region.*
- *Ensuring activity within the Lower Hunter compliments rather than competes with the economies and communities of adjoining regions.*

The LHRS identifies that 66,000 new jobs will be required to 2031. In achieving this goal, over 2,000 hectares of employment land will be required. This land will be divided between employment lands which will provide for local jobs creation (being 825 hectares and 16,500 jobs), and special purpose employment (being 1,200 hectares and in excess of 8,000 jobs).

The Strategy recognises the difference between local employment support, and the need to provide 825 hectares for employment land to support local employment, and special purpose employment associates with specific industries within the Hunter and the need to provide a further 1,200 hectares of vacant employment land.

There are significant residential developments occurring in the vicinity of the proposed TSF. These include:-

- The proposed Huntlee Town Centre, which is expected to provide housing for approximately 20,000 people and also provide land for industrial and commercial purposes. The Huntlee Town Centre lies to the west of the development site.
- Anvil Creek development site, which is a significant residential development to the south of the subject site.
- Some further minor development is likely around the Township of Greta.

These future residential sites will provide a source of potential employees for the Greta site in both the construction and operation phases of the development.

The Lower Hunter Regional Strategy recognises that employment land within the Lower Hunter is required not only to accommodate its own projected economic growth, but also to contribute to meeting the employment land needs of the broader metropolitan region of Sydney.

As discussed above, one of the economic challenges for the region as expressed in the objectives of the LHRS is to “*maximise the economic opportunities associated within the region’s competitive advantages, in particular its economic infrastructure and specialised centres.*” The Port of Newcastle is classed as a Special Purpose Centre. The delivery of coal to the Port of Newcastle is the main driver of expansion and jobs growth within this special centre. Therefore, the provision of infrastructure and services that feed the Port is critical to its ongoing operation. The Project would help deliver coal to the Port of Newcastle.

The LHRS does not identify any specific objectives for the township of Greta.

Overall, it is considered that the Project is consistent with the LHRS as it will provide jobs creation in an easily accessible location from existing and future residential settlement patterns within the region. The Project would also help meet the LHRS’ objective to maximise the economic opportunities associated within the region’s competitive advantage being the Port of Newcastle and associated coal activities.

5.7.2 LOWER HUNTER REGIONAL CONSERVATION PLAN

The LHRCP details a 25 year program to direct and drive conservation planning and efforts in the Lower Hunter Valley. The LHRCP:-

- Analyses the impacts of the urban development scenarios in the LHRS.
- Presents a biodiversity investment guide that identifies areas that could be targeted for public or private land conservation or restoration.

- Identifies mechanisms for biodiversity conservation through investment in the Lower Hunter (at a landscape level).
- Provides a guide for local government authorities to plan for biodiversity protection, conservation and management, and local environmental planning instruments.

The LHRCP does not raise any specific conservation efforts for Greta or the subject site. The Project would result in some clearing of native vegetation on site which may have an impact on biodiversity if not properly managed.

Mitigation measures, including off-setting, have been proposed to minimise the impact of this clearing. Overall, this is considered an acceptable outcome and the Project is considered to not raise any issues that conflict with the LHRCP.

5.7.3 CESSNOCK CITY WIDE SETTLEMENT STRATEGY

The Cessnock City Wide Settlement Strategy (2003) (CWSS) was prepared by Council, based on extensive community consultation and was endorsed 2003. The CWSS sets future direction for population growth throughout the Cessnock LGA for the next 10 years; 'captures' land for closer residential settlement beyond the 10 year timeframe; provides the basis for new planning policy for rural tourism; and the foundation for sustainable planning policy which balances growth with the natural, scenic and cultural assets of the LGA.

A Draft (revised) CWSS (2009) (Draft CWSS) has been prepared to accompany the new Draft LEP. The Draft CWSS has:-

- Updated land supply/demand and the statistical data.
- Deleted all references to catchments – no longer relevant (new legislation).
- Ensured consistency with the LHRP and Section 117 Direction 5.1 – Implementation of Regional Strategies.
- Reviewed all adopted directions of the existing City Wide Settlement Strategy (2003) to ensure consistency with the Standard Instrument, with opportunities for urban consolidation and infrastructure planning.

- Incorporated both Stage 1 (Residential and Environmental) and Stage 2 (Commercial and Industrial) into one revised document.

Based on the significance of these revisions and the number of changes proposed to the document in light of changes to the NSW planning system, it is considered appropriate to provide an assessment of the Project against the Draft CWSS. One of Cessnock City Council's stated goals within the Draft CWSS is to *"actively foster the creation of employment and sustainable development opportunities acceptable to community and environmental standards"*.

One of Council's chief concerns is the creation of sustainable employment to the members of the local community.

The Draft CWSS recognises that to generate the right environment to nurture job creation, Cessnock City Council strives to undertake a number of actions, including the provision of land suitably zoned for appropriate commercial and industrial activities.

To consider the employment needs of Cessnock City Council within the context of the LHRs, the Council prepared the Draft CWSS with a section devoted to employment lands. The Draft CWSS deals mainly with existing employment lands zoned for industrial purposes within the LGA, however, it also recognises that there are a number of significant industrial developments located within the rural areas in Cessnock which make a significant contribution to employment within the LGA. The Project would provide an additional land use within this category.

The CWSS recognises the need for 1,200 hectares required for special purpose industry identified in the LHRs. Similar to the LHRs the CWSS policy also draws the distinction between the local service based industry and export industry.

Local service based industry needs to be accessible to the population centres and supply markets in the local area, and in many instances, these businesses require street frontage for exposure to passing trade and many retail goods and services manufactured on the premises from the shop front or warehouse. The Draft CWSS recognises that Land within Cessnock, Kurri Kurri, Branxton and Weston meet these local needs.

The Draft CWSS recognises that “...strategic export sectors on the other hand have different location needs, requiring direct access to their primary products, larger land areas for more significant operations and access to major national and state transport infrastructure for access to markets outside the region. In many cases they do not rely on direct exposure to the local markets since this is not a core market for their business. The location of new export land in the region will need to ensure that, while remaining reasonably approximate to the local labour force, the areas take advantage of major transport infrastructure of large tracks of flat land capable of accommodating a wide range of larger businesses.” (Page 132, Draft City Wide Settlement Strategy 2007).

The Draft CWSS clearly understands that Cessnock needs to provide opportunities for export markets to take advantage of existing infrastructures, such as railway lines, within the region. The Project would meet this objective and would provide a facility adjacent to the Main Northern Railway and the proposed Hunter Expressway, which services the export markets associated with the Port of Newcastle.

In addition to the provision of employment lands, the Draft CWSS also highlights the importance of maintaining the existing hierarchy of centres. Greta is identified as a village centre within the CWSS. The Project would not compromise the existing village centre traits of Greta as the Project would be located to the south of the existing township and commercial area.

Overall, it is considered that the Project would help Cessnock meet its objective for the provision of suitable employment lands without impacting on the village centre characteristics of Greta. As such, it is considered that the Project is consistent with the CWSS and the Draft CWSS.

6 CONSULTATION

6.1 INTRODUCTION

The DGR's state that the Environmental Assessment must reflect an appropriate and justified level of consultation with relevant parties during the preparation of the Environmental Assessment. This section details consultation undertaken with the relevant government authorities, other stakeholders and the public. All community consultation undertaken to date is documented below as well as details of any issues raised. Where issues have been raised, a cross reference to where these have been addressed in the Environmental Assessment has been included.

Key Insights were engaged to develop and implement a consultation strategy for the Project. In addition to the formal consultation strategy, a number of meetings were held with the relevant government authorities and stakeholders to discuss the Project. The objectives of the consultation activities during the concept design phase and the preparation of the Environmental Assessment for the Project were:-

- To provide government authorities, stakeholders and the public, information about the Project including the planning process.
- To provide government authorities, stakeholders and the public, with the opportunity to detail their views and opinions about the Project, including any issues they would like considered.
- To identify issues and suggestions to be incorporated into the concept design to address concerns raised by government authorities, stakeholders and the public.

A Planning Focus Meeting (PFM) was held in Newcastle for the Project and was attended by representatives from ARTC, DECCW, Cessnock City Council and Mine Subsidence Board. A Community Information Session (CIS) was held on 20 February 2010 at Greta. The results for the CIS are discussed in detail in Attachment 1 of Appendix N of this report.

Further to pre-lodgement consultation undertaken for the Project during the concept design phase, the EA will also be formally exhibited by the DOP for a minimum period of least 30 days. During the exhibition period, submissions would be invited from relevant agencies and members of the public.

6.2 GOVERNMENT AUTHORITIES

Consultation has been undertaken with all tiers of government as detailed below:-

6.2.1 LOCAL

Consultation has taken place with Cessnock City Council (CCC) staff on a number of occasions including 22 December 2008, 6 May 2009 and 23 September 2009, and Councillors on 19 October 2009 and 26 October 2009. As noted above, CCC also attended the PFM on 23 September 2009. A Project briefing was delivered to Council on 25 February 2010. Council have expressed support for the Project, particularly in regard to the proposed positive economic impact, this is discussed in Section 14. No significant issues were raised during consultation with Council.

6.2.2 STATE

In accordance with the requirements of the DGR's consultation has been undertaken with the following agencies:-

- Department of Environment, Climate Change and Water, including the Office of Water.
- Department of Industry and Investment.
- NSW Rural Fire Service.
- Mines Subsidence Board.

As noted above, DECCW, DOP and MSB also attended the PFM on 23 September 2009. Department of Environment, Climate Change and Water (including the Office of Water) provided formal advice indicating that they did not wish to be consulted prior to submission of the Project Application. The Department of Industry and Investment have stated their support for the Project via email. The NSW Rural Fire Service was consulted as part of the Bushfire Threat Assessment Report. No significant issues were raised as a result of this consultation, as discussed in Appendix H.

Original discussions were held in 2004 between Douglas Partners and the Mine Subsidence Board indicated that the Mine Subsidence Board (MSB) will have no major objections to the proposed development.

However, significant investigations will be required to provide the Mine Subsidence Board with the information to work with Douglas Partners to mitigate any risk. These are currently being undertaken and would be discussed with the Mine Subsidence Board during the detailed design phase.

Additionally, numerous meetings have been held with the NSW Department of Planning including in Newcastle on 28 April 2009 and Sydney on 27 January 2009.

6.2.3 COMMONWEALTH

Consultation has taken place with the DEWHA regarding whether the Project comprises a controlled action under the EPBC Act. As discussed above, an EPBC Act referral was forwarded to DEWHA in November 2009 which was received by DEWHA on 15 December 2009.

DEWHA determined that the proposed action is a controlled action, and is likely to have a significant impact on threatened species and Ecological Communities (s18 and s18A), as it involves the clearing of up to 50 hectares of native vegetation that is classified as critical habitat for the Grey-headed Flying-Fox and import habitat for the Regent Honey Eater. Section 7 of this report provides an assessment of the potential impacts of the Project on these Commonwealth matters. Supplementary DGR's were issued for the Project on 24 February 2010, as detailed in Table 2 Section 1. Table 2 also details where in this report these issues are addressed.

6.3 SERVICE AND INFRASTRUCTURE PROVIDERS

Consultation was undertaken with the relevant service and infrastructure providers including the Roads and Traffic Authority, Hunter Water Corporation, Energy Australia, Newcastle Port Corporation, Australian Rail Track Corporation and RailCorp. The outcomes of this consultation, including any issues raised and where they are addressed in this report, is detailed below.

6.3.1 NSW ROADS AND TRAFFIC AUTHORITY

A meeting was held on 14 January 2010, with the NSW RTA to discuss the Project in the context of the Hunter Expressway.

No issues were raised, however, the RTA requested that the EA for the Project consider the cumulative traffic impacts of the two projects. This has been done and is detailed in Section 8.3.8 of this report.

6.3.2 RAILCORP

A letter providing an overview of the Project was forwarded to RailCorp on 22 January 2010.

6.3.3 AUSTRALIAN RAIL TRACK CORPORATION

As noted above, ARTC also attended the PFM on 23 September 2009. Further consultation with ARTC has taken place. ARTC are aware of the requirements of the Project. As the Project requires connection to ARTC's proposed third track, including a connection agreement which has been obtained from ARTC. Consultation with ARTC has been ongoing.

6.3.4 HUNTER WATER

The Project has been discussed with Hunter Water on 24 September 2009, in particular, regarding servicing of the Project including availability of water and waste water disposal. Advice has been received from Hunter Water and details regarding servicing the site are contained within Section 3 of this report.

6.3.5 NEWCASTLE PORT CORPORATION

The Project has been discussed with the Newcastle Port Corporation (NPC) at a meeting dated 26 November 2009. Following this meeting, NPC provided a letter of support dated 14 December 2009. NPC did not raise any issues with the Project stating that *"NPC has reviewed the submitted documentation and is highly supportive of the proposal, on the basis of its potential to improve the efficiency and capacity of the Hunter Valley coal chain. In particular, NPC notes that the proposal has the ability to divert re-fuelling activity from Kooragang Island thus reducing rail congestion on Kooragang Island. If achieved this would benefit both coal and non-coal trades on Kooragang Island"*. Overall, it is concluded that NPC is supportive of the Project.

6.4 SPECIALIST INTEREST GROUPS

An initial Aboriginal Focus Group (AFG) meeting was held on 20 October 2009. A second AFG meeting was held on 22 December 2009. These meetings were held to provide an introduction of the site and the Project to registered stakeholders. A number of issues were raised at these two focus group meetings. These issues are discussed in Section 11 of this report. The meetings are documented within the Aboriginal Heritage Cultural Heritage Assessment Report prepared for the Project, a copy of which is contained within Appendix I.

6.5 THE PUBLIC

A community consultation meeting was held at Greta on 20 February 2010. This meeting was held by Key Insights. There were approximately 100 attendees at the CIS. Of the 83 registrations 61 came from immediate neighbours and the Greta township, including nine people from Mansfield Street and five people from Cliff Street. The remainder came from Branxton, Rothbury, Buchanan and eight attendees gave PO Box numbers. A total of 55 attendees completed a feedback form. The key findings from the feedback form were:-

- The major benefits identified by local people were employment (28 responses and 35% of all responses), local infrastructure and services (nine responses and 11% of all responses).
- The major concerns identified by local people were noise (37 responses and 30% of all responses) and traffic congestion (28 responses and 23% of all responses). Impacts relating to noise are discussed in Section 9 of this report, while traffic impacts are discussed in Section 8.
- When asked about their overall attitude to the Pacific National proposal:
 - 24 people or 44% of respondents supported the proposed development.
 - 17 people or 31% were did not support it.
 - 11 people or 20% were neutral.
- Forty people or 73% of respondents said that the information session increased their knowledge of the proposal and only six people (11%) said they did not receive the information they wanted.

- Fourteen people (26% of respondents) suggested that the information session answered all their questions; 32 people (58%) said that some of their questions were answered; and only two people (4%) said they had none of their questions answered.
- When asked how they would like to be consulted by Pacific National in the future about this proposal people made the following responses:-
 - Community information day (30 responses and 28% of all responses).
 - Project Update Newsletter (21 responses and 20% of all responses).
 - Face to face meetings (17 responses and 16% of all responses).

Through conversations held on the day with local people, it was clear that residents were often identifying cumulative impacts and had existing noise issues with trains on the rail lines and concerns about the development of a third track. This is discussed in Section 9 of this report.

In addition to the CIS, a Stakeholder and Community Liaison Plan (SCLP) was developed and implemented for the Project. The purpose of the SCLP was to:-

- Identify key Project stakeholders.
- Outline the basis for coordination and management of stakeholder and community consultation.
- Identify stakeholder and community risks and opportunities.
- Identify and define roles.
- Outline approaches to implementing the SCLP.
- Allow Pacific National to meet requirements of the draft Statement of Commitments, the Conditions of Approval and the Environmental Protection Licence.

As per the SCLP, near neighbour consultation has taken place. This consultation was undertaken as a separate process to the CIS and typically involved one on one discussions with land owners. The main issues raised as part of this consultation relate to noise and visual impact. These are addressed in Sections 9 and 15 respectively. Some concerns were also raised about the potential impact the Project would have on their property value.

Throughout the Project, the SCLP would continue to be monitored and maintained throughout construction of the Project. A Near Neighbour Consultation Strategy would also be implemented for the Project. Additionally, a Project hotline would be established as a mechanism to monitor and record any Project complaints.

6.6 CONCLUSION

As detailed above, an appropriate and justified level of consultation has been undertaken with the relevant parties during the preparation of the Environmental Assessment and concept design. Further to pre-lodgement consultation undertaken for the Project during the concept design phase, the EA will also be formally exhibited by the DOP for a minimum period of least 30 days. During the exhibition period, submissions would be invited from relevant agencies and members of the public. Overall, it is considered that a suitable consultation strategy, which is appropriate for the Project, has been undertaken.

7 ECOLOGY

7.1 INTRODUCTION

The Director-General's requirements identified ecology as a key issue for the Environmental Assessment. This section identifies the potential ecological impacts of the Project for construction and operation. The information presented in the Flora and Fauna Assessment is based on a review of available ecological data pertaining to the study area and field surveys. The data has been used to assess the significance of potential impacts from the proposal on listed species, ecological communities and populations of local, regional, state and national conservation significance, and their habitats, which are known or considered likely to occur within the study area. Mitigation measures are also discussed to reduce these impacts. Any residual impacts are discussed where applicable. The management measures are further detailed in the draft SOC contained in Section 18. **Table 8** below outlines the Director-General's requirements and where they have been addressed in this report.

Table 8 Director-General's Requirements for Ecology

DIRECTOR-GENERAL'S REQUIREMENTS	SECTION ADDRESSED
Threatened species, populations, endangered ecological communities and/or critical habitat;	Section 7.3 Section 3 and 4 in Appendix A
Surveys of identified species and habitat including the Lower Hunter Spotted Gum Ironbark Forest;	Section 7.3 Section 3 and 4 in Appendix A
Vegetation Clearing (foraging, roosting, nesting, habitat loss and fragmentation). Riparian impacts and operational impacts (such as lighting and noise);	Sections 7.4 and 16.5 Chapters 9 and 16.
Surface and groundwater impacts and management; and	Section 16.4
Taking into account of the <i>Draft Guidelines for Threatened Species Assessment</i> (DEC and DPI, 2005) and <i>Principles for the Use of Biodiversity Offsets in NSW</i> (DECCW, 2008).	Section 7.2. Section 2 in Appendix A.

7.2 ASSESSMENT APPROACH

SKM prepared a Flora and Fauna Assessment for the Project in accordance with *Draft Guidelines for Threatened Species Assessment* (DEC and DPI, 2005) and *Principles for the Use of Biodiversity Off-sets in NSW* (DECCW, 2008).

A comprehensive flora survey was conducted to provide baseline floristic data and investigate the presence of threatened plant species, populations and/or endangered ecological communities in the study area. The distribution and extent of vegetation communities in the locality was initially identified from previous broad-scale vegetation maps. The existing vegetation maps of the site were ground-truthed and refined to an appropriate scale specific to the study site.

The assessment of impacts on terrestrial fauna utilised quantitative and qualitative data sourced from field surveys, and background reviews and knowledge of the fauna of the regional area. Data was collected on the type and distribution of fauna habitats and fauna species richness, distribution and abundance focusing on threatened species listed under the *TSC Act* and *EPBC Act*.

Fauna survey sites were selected to sample the range of habitat types identified on the site based on the initial stratification. The fauna survey was conducted during the spring season of 2009 (i.e. September-October) and was designed in general accordance with the *Draft Threatened Biodiversity Survey and Assessment Guidelines* which included diurnal and nocturnal census. Habitat assessment was also conducted to provide a landscape evaluation of the habitats in the study area and surrounding or proximal areas. Targeted surveys were also undertaken including call playback and trapping.

A detailed description of the methodology used to prepare the Flora and Fauna Assessment is contained within Chapter 2 of the Flora and Fauna Assessment Report within Appendix A.

7.3 DESCRIPTION OF EXISTING ENVIRONMENT

The site comprises a mixture of both cleared lands and bushland. The site comprises 46.57 hectares. Approximately 40.2 hectares of the site is vegetated. This represents approximately 86% of the site. The following text details a description of the existing ecological environment from both background review and survey data.

7.3.1 **BACKGROUND REVIEW**

Endangered Ecological Communities

A review of existing vegetation data (LHHCREMS, 2003) in relation to the study area indicates that the vegetation on site consists of Lower Hunter Spotted Gum – Ironbark Forest, an EEC listed under the TSC Act. Two other EECs have been mapped on surrounding lands comprising Hunter Lowlands Red Gum Forest and the preliminary-listed Central Hunter Ironbark – Spotted Gum – Grey Box Forest (LHHCREMS, 2003; Peake 2006).

Threatened Flora

On the basis of regional records, reports and the presence of suitable habitat, a total of six threatened flora species potentially occur in the study area including North Rothbury Persoonia, *Acacia bynoeanna*, *Cryptostylis hunterianna*, Slaty Red Gum, *Eucalyptus parramattans* subsp. *decadens*, and *Grevillea parviflora* subsp. *parviflora*. Their likelihood of occurring within the study area is detailed within Appendix C of Appendix A.

Threatened Fauna

On the basis of regional records and reports, and the presence of suitable habitat, a total of 35 threatened fauna species potentially occur in the study area. These species and their likelihood of occurring within the study area are listed within Table 5 of Appendix A.

Migratory Fauna

A total of 12 migratory fauna species were identified in the EPBC Act Protected Matters Report (September 2009), as potentially occurring in the study area.

These species and their likelihood of occurring within the study area are listed within Table 6 of Appendix A.

7.3.2 **SURVEY DATA**

Floristic Diversity

The majority of the study area supports remnant vegetation in a moderate to high ecological value, including remnant and regenerating areas.

Some areas of low ecological value are also present on site and exhibit some evidence of previous disturbance in the form of selective vegetation clearance, track formation and minor weed invasion as a result of past land use activities.

Native flora species richness within the site was high within the remnant vegetation of the study area, with a total of 223 plant species from 70 families identified. This total comprised three species of fern, one conifer species, 138 species of dicotyledons and 81 species of monocotyledons. Of the total species recorded, 49 species of introduced flora were identified, representing approximately 22% of the total species. A comprehensive list of the flora species present within the study area has been included as Appendix A to the Flora and Fauna Assessment Report contained in Appendix A.

Vegetation Communities

Two main vegetation communities were identified within the study area comprising higher elevated drier habitats dominated by Spotted Gum (*Corymbia maculata*) and Narrow-leaved Ironbark (*Eucalyptus crebra*), and habitats within and surrounding drainage lines and open depressions dominated by Forest Red Gum (*Eucalyptus tereticornis*). The study area is within an ecotonal area between vegetation community types of the central and lower Hunter region.

Based on the dominant canopy species the Spotted Gum – Ironbark vegetation community in the study area is more consistent with Central Hunter Ironbark – Spotted Gum – Grey Box Forest. Additionally there are open paddock areas supporting regenerating shrubs on the edges of remnant vegetation at the southern end of the study area.

Endangered Ecological Communities

The presence of one currently listed EEC and one preliminary listed EEC (Schedule 1 Part 3 of TSC Act) was confirmed within the study area being Lower Hunter Spotted Gum – Ironbark Forest in the Sydney Basin Bioregion, and Central Hunter Ironbark – Spotted Gum – Grey Box Forest in the NSW North Coast and Sydney Basin Bioregion respectively.

The condition of most of these EECs is regarded as being moderate to high, and hence vegetation of the study area is regarded as being of conservation significance, providing habitat for a diversity of native flora and fauna species including invertebrates and cryptograms. Some areas of low significance are also present on site. Refer to **Figure 12**.

Rare and Threatened Flora

Targeted searches were undertaken for several threatened flora species with a high-moderate potential to occur in the study area. Only one rare flora species was recorded within the study area being *Grevillea Montana*.

Fauna Habitat and Condition

Both naturally occurring and modified fauna habitats occur on the site as a result of the past land-use history including mining and agriculture. Remnant open forest habitats dominate the northern and western portions of the site and include Spotted Gum / Ironbark forest mostly over undulating slopes, with Forest Red Gum tending to dominate the lower lying lands, gullies and riparian areas. Several other tree species are also present in both habitats including Rough-barked Apple and Grey Gum. The structural and floristic diversity of the remnants forests is moderate to high, incorporating a dense upper canopy 18-25 metres and sparse small tree layer dominated by *Acacia* spp and *Melaleuca* spp.

Ground cover vegetation varies in density between open grassy understorey in Spotted Gum dominated forests and dense shrubby understorey to 1 metre in height in the Forest Red Gum habitat.

Tree hollows are abundant in the remnant forest with densities of up to five trees per hectare observed at the northern end of the site including dead trees.

Habitat for hollow-dependent fauna is represented across all forested portions of the site except for the cleared lands and regenerating shrub land or young regrowth (up to 20% of the site). The condition of the riparian habitat varies across the site, with the highest condition occurring furthest west and continuing off-site to the west. At the eastern end of the site, the condition is lower and indicative of past clearing and disturbance.

Open cleared grassland occurs in the central southern end of the site, with some previously cleared areas now exhibiting regenerating shrub land. This habitat is used extensively by grazing kangaroos and some common bird species. Aquatic habitat is represented by two natural creek lines, one in the northern end and one in the southern end of the site. The latter is larger and deeper and both creeks exhibit a sandy substrate with dense macrophyte fringing vegetation mainly sedges and rushes and provide important habitat for fauna, particularly frogs and some birds. Several artificial farm dams are scattered throughout the site and these have also been colonised with macrophyte vegetation and provide habitat for fauna. Several common frog and bird species were found to be associated with these habitats.

Fauna Diversity

A total of 72 fauna species were recorded on the site, comprising 42 bird species; 13 mammal species; eight frog species; and nine reptile species. One bird and one mammal species are introduced fauna and the remainder are native species.

The range of habitats present on site, support a moderate diversity of bird species represented predominantly in abundance by honeyeaters. Other groups include granivores, raptors and insectivores. The most common species observed during the survey included the Musk Lorikeet (*Glossopsitta concinna*); Yellow-faced Honeyeater (*Lichenostomus chrysops*); Eastern Rosella (*Platycercus eximius*); Brown Thornbill (*Acanthiza pusilla*); and Grey-crowned Babbler (*Pomastomus temporalis temporalis*). The Squirrel Glider (*Petaurus norfolcensis*) and Common Brushtail Possum (*Trichosurus vulpecula*) dominate the arboreal mammal fauna found in both forested habitats. Yellow-footed Antechinus (*Antechinus flavipes*), Common Wombat (*Vombatus ursinus*) and Echidna (*Tachyglossus aculeatus*) are also present.

Low numbers of Eastern Grey Kangaroo's (*Macropus giganteus*) were observed grazing in the cleared and modified portions of the site, and the Red-necked Wallaby (*W.bicolor*) and Swamp Wallaby (*M.rufogriseus*) in the forested habitats.

The herpetofauna recorded was considered reasonably diverse considering the size of the site and is reflective of the range of microhabitats and condition of the aquatic habitats and the warm and humid conditions during the survey.

Several common frog species were recorded dominated by Peron's Tree Frog (*Litoria peroni*); Eastern Dwarf Tree Frog (*L. fallax*); and Broad-palmed Frog (*L. latopalmata*), particularly associated with artificial dams, although also the two natural creeks. The reptile assemblage comprised five skink species (Family Scincidae); two dragons (Agamidae); the Lace Monitor (*Varanus varius*); and Red-bellied Black Snake (*Pseudechis porphyriacus*).

Threatened Fauna

Two listed fauna species were identified on the site, the Squirrel Glider (*Petaurus norfolcensis*), and Grey-crowned Babbler, eastern subspecies (*Pomastomus temporalis* subsp. *Temporalis*). Both species are listed under Schedule 2 vulnerable species of the NSW TSC Act. A third species, the Speckled Warbler (*Pyrrholaemus saggitatus*), was identified on contiguous habitat to the west of the site and is considered to utilise the Spotted Gum/Ironbark habitat on the site. The habitats and microhabitat features present are suitable for several other regionally reported threatened fauna, including:-

- Swift Parrot and Regent Honeyeater.
- Grey-headed Flying-fox.
- Woodland birds – Brown Treecreeper, Black-chinned Honeyeater, Diamond Firetail, and Hooded Robin.
- Masked Owl and Powerful Owl.
- Cave-roosting bats – Eastern Bentwing-Bat and Little Bentwing-bat.
- Tree-roosting bats – Eastern False Pipistrelle, Greater Broad-nosed Bat, Yellow-bellied Sheath-tail Bat and Eastern Freetail Bat.

Further information regarding specific species on the site is listed in Chapters 3 and 4 of Appendix A. **Figure 12** and **Figure 13** below map the vegetation communities and fauna habitats and records located on the site.

Figure 12 Vegetation Communities on Site (Source: SKM)

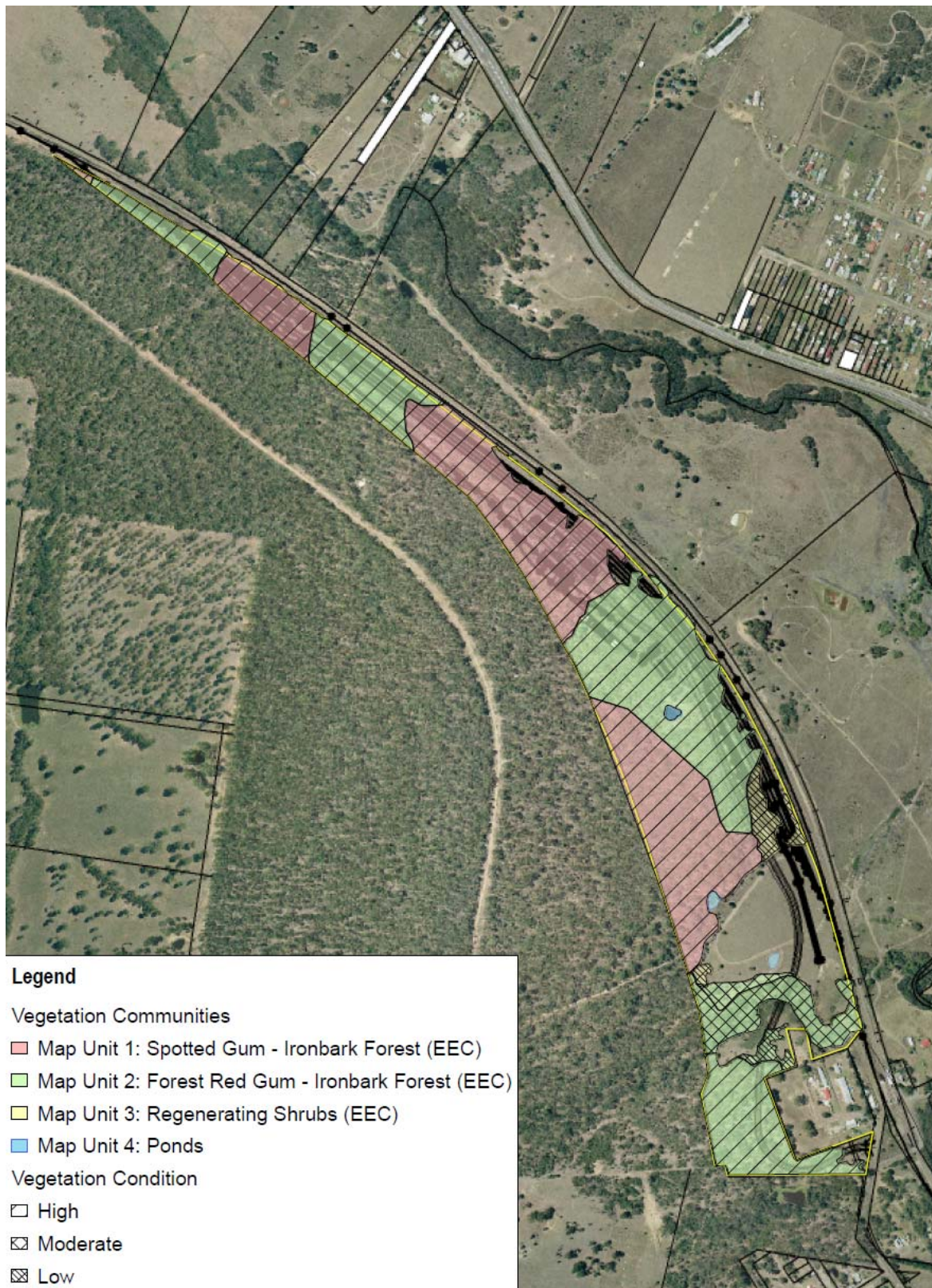
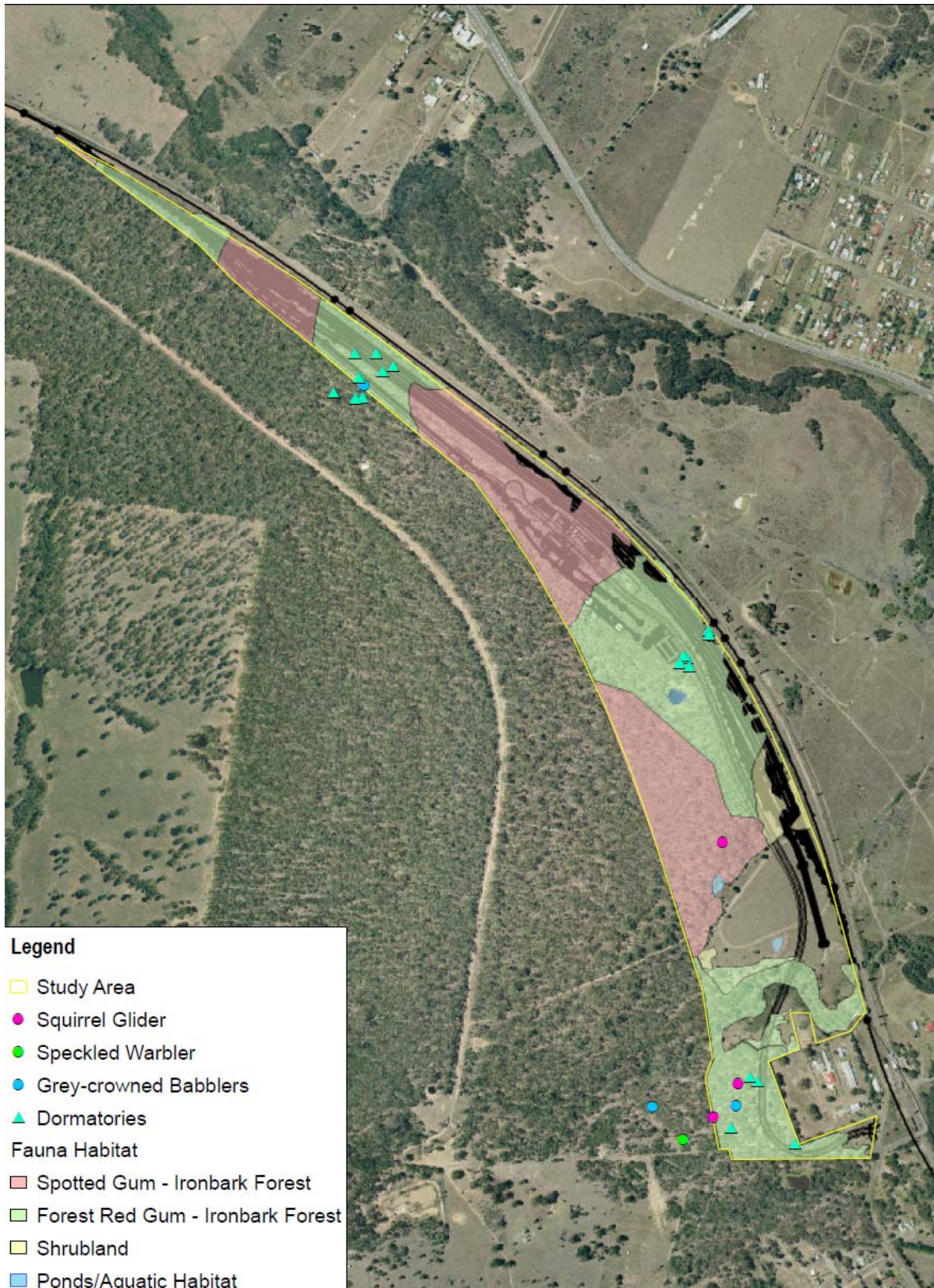


Figure 13 Fauna Habitats and Records on Site (Source: SKM)



7.4 ASSESSMENT OF POTENTIAL IMPACTS

As discussed, the majority of the study area supports remnant vegetation in a near natural condition, with the exception of introduced flora. Some disturbances are evident and associated with previous land uses which date back several decades. The presence of two listed EECs (Schedule 1 part 3, TSC Act) was confirmed within the study area:-

- Lower Hunter Spotted Gum – Ironbark Forest in the Sydney Basin Bioregion.
- Hunter Lowland Redgum Forest in the Sydney Basin and North coast Bioregions.

The condition of these EECs ranges from moderate to high providing habitat for a diversity of native flora and fauna species including rare and threatened species. Some areas of regenerating forest were also identified which are early stages of recovery of these EEC types.

A summary of the ecological values recorded on the site is presented in **Table 9** below.

Table 9 Summary of Ecological Values Recorded on Site

THREATENED SPECIES/COMMUNITIES/HABITATS	STATUS
Lower Hunter Spotted Gum Ironbark Forest	EEC (TSC Act)
Hunter Lowland Red Gum Forest	
Kurri Spider Flower (<i>Grevillea Montana</i>)	RoTAP ¹
Squirrel Glider (<i>Petaurus norfolcensis</i>)	Vulnerable (TSC Act)
Grey-crowned Babbler (eastern subsp) (<i>Pomatostomus t. temporalis</i>)	Vulnerable (TSC Act)
Speckled Warbler (<i>Pyrrholaemus saggitatus</i>)	Vulnerable (TSC Act)
Critical foraging habitat for Grey-headed Flying-Fox (Draft Recovery Plan)	Vulnerable (EPBC Act, TSC Act)
Identified foraging habitat for several threatened fauna species	Regionally Significant
Hollow-bearing trees	Locally Significant

RoTAP – Rare or Threatened Australian Plant (not currently listed)

The ecological values of the site were considered at the preliminary environmental and planning stages of the proposal. Ecological data gathered from the background review and field surveys was considered as a guide to the refinement of the development footprint, and to devise appropriate design features and mitigation measures to avoid and minimise long-term impacts on biodiversity.

Potential impacts may arise at both construction and operation stages of the Project. The potential impacts to flora and fauna from construction activities, primarily relate to vegetation clearance. Vegetation clearance may impact on riparian vegetation and habitat connectivity. Potential impacts to riparian vegetation are discussed below in Section 7.4.3, while potential impacts to habitat connectivity are discussed below in Section 7.4.4. Operational impacts may also be experienced including indirect impacts, such as edge effects as discussed in Section 7.4.1, cumulative impacts as discussed in Section 7.4.5, Impacts to aquatic habitats as discussed in Section 7.4.2, and noise, light and traffic impacts as discussed in Section 7.4.6.

Table 10 below details the following potential ecological impacts relating to vegetation clearance which are expected as a result of the Project. As detailed, approximately 18.5 hectares of vegetation is proposed to be removed from the site.

Table 10 Potential Ecological Impacts of the Project

MAP UNIT	ENDANGERED ECOLOGICAL COMMUNITY	TOTAL AREA ON SITE (HA)	DIRECT IMPACT (HA) AND CONDITION		
			High	Med	Low
Map Unit 1: Spotted Gum – Ironbark Forest	Lower Hunter Spotted Gum – Ironbark Forest	17.5	8.0	-	-
Map Unit 2: Forest Red Gum – Ironbark Forest	Hunter Lowlands Red Gum Forest	21.4	9.3	0.2	0.2
Map Unit 3: Regenerating Shrubs	Hunter Lowlands Red Gum Forest	1.0	-	-	0.8
Map Unit 4: Aquatic Habitat (ponds)	N/A	0.2	-	-	-
Total		40.2	17.3	0.2	1.0

There is considerable scope to restore and revegetate degraded and cleared portions of the site outside of the development footprint, to mitigate potential impacts. In this regard, an Ecological Restoration/Management Plan is proposed, which will focus on restoring the riparian vegetation on the site as well as active planting and regeneration techniques on currently cleared lands and the closure and rehabilitation of existing vehicle and recreational tracks. This is reflected in the mitigation measures for the Project.

7.4.1 EDGE EFFECTS

Given that a portion of the existing habitat on site will be retained adjacent to the project footprint it is reasonable to expect some edge effects associated with the newly created edge. The type and extent of edge effect is highly variable and may be related to biotic and biological factors such as age, vegetation structure, aspect, matrix type and management history. As discussed in Section 5.3.2 of Appendix A, there is a clear tendency of edge effects to vary with vegetation structure; they are greatest at new or induced edges and less obvious at old or inherent edges.

Edge effects are expected to be created along the border of the project footprint where 'new' edges would be created through currently vegetated areas. Edge effects would be greatest in the northern half of the site adjoining remnant vegetation and the least at the southern end adjoining partially cleared landscapes which are already edge affected. The result of edge effects may be an increase in weed diversity and abundance with higher light availability into currently shaded interior areas. This may affect native plant species which are competing with weeds and associated with changes to physical attributes such as sunlight, hydrological regimes and soil nutrients. No threatened plant species were recorded on the site, although all communities are part of an endangered ecological community.

Edge effects associated with this project can potentially be reduced through general mitigation and rehabilitation measures associated with the construction and operational stages of the project. The highest priority measures aim to minimise and intersect surface water run-off into adjacent remnant vegetation. Dense landscape plantings using a diversity of local indigenous plant species would reduce the affects of rapid weed invasion into disturbed edge habitats. These measures form part of the landscape rehabilitation plan.

7.4.2 **IMPACT TO AQUATIC HABITATS**

Clearing for the project directly and indirectly effects four ephemeral watercourses on the property, this includes Sawyers Creek in the southern end of the site and three unnamed creeks in the north, all of which flow into Anvil Creek to the east of the site. Sawyers Creek has potential to provide habitat for small native fish species, while the remaining creeks are too small and ephemeral in nature. These habitats are not suited to threatened fish species listed under the *Fisheries Management Act*.

There are also a number of artificially created farm dams. These aquatic habitats provide potential habitat macro invertebrates and macrophytes as well as amphibians. The project has potential to impact on both the surface and groundwater environments during the construction and operational phases of the project. Potential impacts on aquatic habitats include pollution of waterways, change to the hydrological regime, and removal of in-stream woody debris. Removal of in-stream woody debris (snags) is listed as a key threatening process under the FM Act. The disturbance to Sawyers Creek will be limited to the proposed crossing location and no woody debris is present at this location. As mentioned the other creeks do not provide fish habitat.

Increased sedimentation and erosion during construction is also considered a threatening process under the *Fisheries Management Act* 1994 (FM Act). Sediment run-off will be managed under the guidance of a surface water management plan (Worley Parsons 2010).

A surface water management assessment was prepared for the project (Worley Parsons 2010) which identified the potential for these impacts to occur and provides detailed measures to mitigate such impacts such preventative measures and on-site treatment of run-off and sediments. These measures would ensure that impacts to the biodiversity associated with the creeks and dams on site are minimised.

The design for the project has been developed so that the existing groundwater hydrological regime would generally be maintained through the use of culverts where required. Detailed design of culverts on Sawyers Creek would provide appropriate fish passage. The adoption of appropriately designed and maintained water quality controls and protection measures would be implemented to minimise impact on aquatic habitats.

7.4.3 IMPACTS ON CONNECTIVITY

The landscape surrounding the study area is characterised by mosaic of open agricultural land with patches of forest and woodland including riparian vegetation and residential allotments.

A network of rail and roads including unsealed tracks also traverses the landscape with the main northern rail line forming the eastern boundary of the site and the proposed Hunter Expressway forming the western boundary.

The position of the site between the rail line and the future expressway will effectively isolate the site and sever current habitat connectivity to the west.

At present, in the absence of the Hunter Expressway, the habitat on site is continuous to the west with large expanses of comparable forest and woodland habitat on private land, and as such fauna is expected to move freely between the site and adjacent properties. Clearing of vegetation for the Hunter Expressway and within the site itself will contribute to the cumulative fragmentation of habitat in the landscape. Some connectivity to the west is expected at the southern end of the site at Anvil Creek, and via and fauna crossings installed within the proposed Hunter Expressway.

Anvil Creek is located to the east of the site on the opposite side of the rail line where it traverses close to the site at its northern end. The presence of the rail line, including the proposed third track, interrupts the continuity of the habitat on the site with the riparian vegetation along Anvil Creek, although is not an absolute barrier and some movements of fauna across the rail corridor are anticipated.

7.4.4 RIPARIAN VEGETATION

Impacts to riparian vegetation on site will be restricted to narrow crossing of the creek for the access road only. This will occur across an existing track used for access over the creek and a culvert construction will be used. The crossing point has been identified as a degraded portion of the creek in terms of the sparse presence and low condition of the riparian vegetation which is dominated by bracken fern. No significant impact on riparian vegetation as a result of the Project is therefore expected. This is discussed further in Section 16.5.

7.4.5 CUMULATIVE IMPACTS

At the landscape scale, the major potential ecological impacts associated with the project are likely to be the disruption of landscape processes and loss of habitat for regional biodiversity. The locality is characterised by a patchy mosaic of fragmented remnant vegetation interspersed among cleared agricultural and rural land and the proposed development would contribute to this network. As the project would in effect occur in a landscape which is already dominated by human activities, such as farming and rural development, as opposed to a completely natural forested landscape, the cumulative impacts on biodiversity could reasonably be expected to have a low detectability.

Notwithstanding this fact, the project will clear up to 18.5ha of vegetation and therefore would contribute to increasing the ratio of cleared land to remaining habitat in the region. Impacts could be off-set to a degree by the development of a biodiversity off-set strategy. Any such efforts should be based on the objective of maintaining or improving biodiversity values in the project area in the long-term.

7.4.6 NOISE, LIGHT AND TRAFFIC IMPACTS

Increased noise, artificial light and increased traffic on the project site has potential to impact on fauna occupying the conserved habitats on the site, in particularly nocturnal species such as large forest owls and the squirrel glider.

The proponent has indicated that most heavy vehicle traffic would be restricted to day time use and that noise reduction measures have been considered. At present there is a high frequency of trains passing the site continuously and this noise factor is also likely to have some effect on fauna life-cycle activities such that further increased noise activities will be adding to this.

The increased traffic across the site has some potential to impact on fauna through potential vehicle strike. Measures to reduce the impact of artificial lights, noise and traffic are provided in the recommendations section.

7.4.7 KEY THREATENING PROCESSES

The Project would result in some key threatening processes occurring on site, such as clearing of native vegetation and removal of hollow-bearing trees. These are detailed in **Table 11**.

Table 11 Key Threatening Processes

KEY THREATENING PROCESS	TYPE OF THREAT	LEVEL OF THREAT	POTENTIAL IMPACTS
Invasion of native plant communities by exotic perennial grasses	Weed	High	Several exotic perennial grasses were identified in disturbed edges of the site through bushland areas. These species are negatively associated with edge effects.
Invasion, establishment and spread of Lantana camara	Weed	High	Present but not abundant. There is a low probability that these areas would become further infested with the creation of edge effects.
Competition and grazing by the feral European rabbit	Pest animal	Low-Moderate	Evidence of European rabbit was recorded in the study area. The Project may provide additional areas of suitable habitat for European Rabbit.
Competition from feral honeybees	Pest animal	Low	The Project may provide additional areas of suitable habitat for feral honeybees.
Predation by feral cats	Pest animal	Low-Moderate	The Project may contribute to additional predation from feral cats, through habitat fragmentation.
Predation by the European Red Fox	Pest animal	Low-Moderate	The Project may contribute to additional predation from European Red Fox, through habitat fragmentation.
Predation by the Plague Minnow (<i>Gambusia holbrooki</i>)	Pest animal	Low-Moderate	The Project may contribute to additional predation from Plague Minnow.
Clearing of native vegetation	Habitat loss / change	Very High	The Project would result in the clearing of up to 18.5ha of native vegetation
Loss of hollowbearing trees	Habitat loss / change	High	The Project would result in the clearing of hollow-bearing trees with densities of between 2 and 5 trees per hectare.
Removal of dead wood and dead trees	Habitat loss / change	High	The Project would result in the removal of dead wood and dead trees.
Increased sedimentation and erosion during construction	Habitat loss / change	Low	There is potential for increased sedimentation to result due to the construction process.
Loss of aquatic and riparian habitats	Habitat loss / change	Low	The Project would require the removal of only a narrow width of riparian vegetation to accommodate the road crossing.
Installation of instream structures	Habitat loss/ change	Low	The Project would result in the construction of a culvert which may modify the natural flow of the creek. This alteration may disrupt natural reproductive cues and natural processes of erosion and sedimentation resulting in a loss of aquatic habitat for fish and macroinvertebrates.

7.4.8 KOALA HABITAT

The presence of koalas was targeted during spotlighting surveys and general site traverses. An additional assessment was also undertaken to investigate the presence of Potential and Core Koala Habitat (as defined under SEPP 44), which included quantifying tree species and searches for scats (faecal pellets) beneath known Koala food tree species, such as Forest Red Gum (*E.tereticornis*).

Two tree species listed under Schedule 1 of SEPP 44 are present on the site, namely Forest Red Gum (*E.tereticornis*) and Grey Gum (*E.punctata*). Forest Red Gum occurs in densities of greater than 15% of the tree cover in the alluvial forest habitat (Map Unit 2), and as such this community is considered 'potential' koala habitat. The remainder of the site is unlikely to be considered potential habitat for the species as feed tree species occur in very low densities.

No koalas or evidence of individuals were identified from the field survey and there is very limited data to suggest that an historical population occurs in the locality on the basis of two previous records. The site is considered unlikely to be regionally significant or 'core' habitat for koalas.

7.4.9 BIODIVERSITY OFF-SETTING MEASURES

It is recognised that impacts on endangered ecological communities and habitat for threatened fauna species, could not be avoided in the northern half of the site due to the narrow width of the site and the nature of the proposed development, being rail infrastructure. As such, the loss of 18.5 hectares of vegetation will result. The ecological assessment prepared for the Project has identified and quantified the impacts on biodiversity, including the loss of endangered ecological communities and habitat for threatened species.

The Project aims for a net improvement in biodiversity over time. To achieve this, it will be necessary to off-set the loss of 18.5 hectares of vegetation with an area of vegetation of similar size and condition, preferably in the local area. It is also proposed to undertake restoration of currently cleared or degraded parts of the site.

Further consideration any proposed environmental off-sets should take into account the Commonwealth Government's draft policy statement with respect to environmental off-sets under the EPBC Act (DEHWA 2007). In particular the following principals apply to the Project:-

- 1) Environmental off-sets should be targeted to the matter protected by the EPBC Act that is being impacted. In this regard, the project will impact on vegetation communities containing Spotted Gum (*Corymbia maculata*) and Forest Red Gum (*Eucalyptus tereticornis*) which are recognised important or critical foraging habitat for the Grey-headed Flying-fox; and
- 2) The off-set should, as a minimum, be commensurate with the magnitude of the impacts of the development and ideally deliver outcomes that are 'like for like'. In this respect it will be important to target comparably vegetation/habitat types.

A minimum of at least 1:1 off-set ratio would be committed, consistent with the Commonwealth Governments draft policy statement with respect to environmental off-sets under the EPBC Act (DEHWA, 2007). It is however critical that the off-set site contain 'like for like' vegetation types that are in similar condition to the impact site. By off-setting using this approach, combined with the restoration efforts, this would effectively ensure a net gain in the habitat of the nationally listed threatened and migratory fauna species. This off-set and mitigation would therefore be considered sufficient compensation for the proposed loss of habitat.

Based on a review of the LHCCREMS (2003) vegetation map there appears to be sufficient areas of Spotted-Gum ironbark Forest and Forest Red Gum Forest in relative proximity to the project site to adequately compensate for the losses associated with the project.

Outside of the off-set strategy, the recommended Ecological Restoration and Management Plan, as discussed below, is a tool to further minimise impacts during the construction and operation of the facility.

The outcome would include the restoration of currently cleared and degraded portions of the site and hence also contribute to a net gain in the biodiversity values in the area. The plan would target the planting and restoration of critical foraging habitat for the Grey-headed Flying-fox in particular.

7.4.10 IMPACT SIGNIFICANCE ASSESSMENT

The loss of vegetation and fauna habitat would negatively affect several populations of threatened fauna species through the direct loss of known habitat, increasing the fragmentation of habitat and creating barriers to movement and dispersal of individuals.

An assessment of significance of impacts was conducted for known and potential subject species (i.e. listed threatened species) in accordance with the *Draft Guidelines for Threatened Species Assessment* (DECC and DPI 2005), and in the National context in accordance with the *Significant Impact Guidelines for Matters of National Environmental Significance* (DEWHA 2006) has been prepared (refer Appendix A and Appendix B in Appendix A for details).

The assessment has concluded that the Project is unlikely to impose a 'significant impact' on local populations of threatened species, endangered communities or their habitats as listed under the TSC Act and EPBC Act, on the basis that the site will become isolated between the railway and the Hunter Expressway and that these actions will reduce the connectivity, size and value of the habitats on site. It is recognised that the Project will contribute to the cumulative loss of habitat in the locality through the clearing of 18.5ha of vegetation. Therefore it is considered appropriate to offset the impacts of the project through seeking compensatory habitat of similar condition and size.

7.4.11 EPBC ACT ASSESSMENT

The Project has been declared a Controlled Action under the EPBC Act on Threatened Species and Ecological Communities as it involves the clearing of up to 50 hectares of native vegetation that is classified as critical habitat for the Grey-headed Flying-Fox and important habitat for the Regent Honey Eater. An assessment of significance for these two species has been undertaken and is contained in Appendix B of Appendix A. The assessment concludes that the Project is unlikely to have a significant impact on listed species under the EPBC Act. Some mitigation measures have been proposed to mitigate the potential impacts.

A summary of the assessment of significance undertaken for the Grey-headed Flying-Fox and Regent Honey Eater is presented in **Table 12**.

Table 12 EPBC Act Assessment of Significance

ASSESSMENT CRITERIA	REGENT HONEYEATER (ENDANGERED SPECIES)	GREY-HEADED FLYING-FOX
Lead to a long-term decrease in the size of an important population	The current potential for these species to occur based on the presence of potential foraging habitat is expected to remain after completion of the project such that foraging, movement and other life-cycle attributes would not be impacted	It is likely that the clearing of 8 ha of Spotted Gum Ironbark Forest will result in a loss of Spotted Gums (<i>Corymbia maculata</i>) from the local area. As detailed in the proposed mitigation measures, the Project would avoid removal of spotted gum during the period Sept-May and supplement trees lost with restoration of degraded areas as is proposed. Further 9.5 ha will remain on site with the proposal to plant additional cleared areas of the site.
Reduce the area of occupancy of an important population	Species is an occasional visitor to the region. There are no known permanent populations on the site. Any use of the site could potentially occur across all vegetated areas including habitat to be retained and restored on the site	The Project would reduce the available foraging habitat for local population by a very small percentage when considering the total known area of this resource. The Project is not expected to significantly impact on food resources available for local populations of the grey-headed flying-fox.
Fragment an existing important population into two or more populations	Species is an occasional visitor to the region and there are no known resident populations using the habitats on site.	The Project would contribute to the cumulative fragmentation of habitat in the landscape by currently impacting on contiguous forest. Highly mobile species such as bats and birds are expected to be less impacted by fragmentation and the grey-headed flying-fox is particularly well adapted to accessing widely spaced habitat resources given its mobility and preference for seasonal fruits and blossom. The project would not fragment an important population of the Grey-headed flying-fox.
Adversely affect habitat critical to the survival of the species	The habitats on the actual project site would constitute non-breeding habitat for a proportion of the population. The current potential for these species to occur based on the presence of potential foraging habitat is expected to remain after completion of the project such that foraging, movement and other life-cycle attributes would not be impacted.	Adversely affect a relatively small area of habitat that could be considered critical for the local population. It is therefore appropriate to avoid removal of spotted gum during the period Sept-May and supplement trees lost with restoration of degraded areas as is proposed for this project.

ASSESSMENT CRITERIA	REGENT HONEYEATER (ENDANGERED SPECIES)	GREY-HEADED FLYING-FOX
Disrupt the breeding cycle of an important population	There are no reported breeding events or aggregations in close proximity to the site. The site may constitute potential nesting habitat.	The removal of potential foraging habitat during the weeks of birth, lactation and conception of the grey-headed flying-fox (Sept-May) may have a negative impact on the breeding cycle of the species and would be avoided. 54% of the existing vegetation on site will remain during and post construction and the current potential for the species to forage on the site is considered to continue. Additional vegetation would be planted as part of the Ecological Restoration Plan.
Modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	There are no resident populations in this immediate locality and the habitats on the project site would constitute non-breeding habitat for a proportion of the population although is not considered critical habitat. It is likely that the clearing of 8 ha of Spotted Gum Ironbark Forest will result in a loss of Spotted Gums (<i>Corymbia maculata</i>) from the local area. This species is widely distributed throughout the lower and mid Hunter Valley region. A further 9.5 ha will remain on site with the proposal to plant additional cleared areas of the site.	The Project will contribute to the cumulative loss of habitat and therefore it is appropriate to consider offsetting the habitat loss in conjunction with the proposed restoration of degraded portions of the site.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	There is potential for further small scale invasion of weeds and feral animals during the clearing and construction of the Project. This risk would be managed during construction and it is considered unlikely that any extensive degradation would result or that any invasive species would become established. The proposal to prepare and implement a site restoration plan will further ensure that the remaining habitats are buffered from the impacts of invasive species.	
Introduce disease that may cause the species to decline	It is considered unlikely that the project would introduce any diseases.	
Interferes substantially with the recovery of the species	Given the protection of 75% of the potential habitat on site and based on the proposed management measures designed to protect and enhance potential habitat, it unlikely that the Project would interfere with the recovery of these species.	The Project would not conflict with the recovery of this species if the proposed restoration plan and habitat offsetting is implemented. The project footprint has been selected on the basis of avoiding as much habitat as possible and preserving up to 54% of the forested habitat on site.

7.5 MITIGATION MEASURES

The Project would involve the clearance of 18.5ha of vegetation and disturbance to flora and fauna habitat, including threatened species and EECs, within the subject site. A series of recommendations are provided that are designed to minimise the potential impacts as a result of this clearing and disturbance. The mitigation measures provided below include mitigation and management practices during the construction period, as well as setting aside of areas of land as off-sets for the loss of habitat for threatened species and endangered ecological communities which would occur on site.

7.5.1 MITIGATION MEASURES

The following measures should be considered to reduce the ecological impact of the Project:-

- It is recognised that impacts on endangered ecological communities and habitat for threatened fauna species could not be avoided in the northern half of the site due to the narrow width of the site. This assessment has identified and quantified the impacts on biodiversity which includes the loss of 18.5 hectares of vegetation, including state listed endangered ecological communities and habitat for state and federal listed threatened fauna. The Project should therefore aim to use this information in considering the selection of appropriate compensatory or off-set habitat. Any proposed off-set strategy should aim to replace residual impacts by seeking an area of vegetation of similar size and condition to that being lost in the local area if possible or in proximity to the site, which may also consider restoration of adjacent degraded areas.
- There is considerable scope to restore and revegetate degraded and cleared portions of the site outside of the development footprint. In this regard, an Ecological Restoration and Management Plan should be developed that focuses on restoring the riparian vegetation on the site, as well as active planting and regeneration of currently cleared lands and the closure and rehabilitation of existing vehicle and recreational tracks. The plan should be prepared prior to construction and will identify the areas of focus, provide a set of objectives and actions required to restore, maintain and monitor the success of the plan with an adaptive approach.

The restoration plantings should aim to maintain local genetic uniqueness through the collection of seed on the site prior to clearing and plant species characteristic of the EEC's to be cleared.

- The Ecological Restoration and Management Plan should outline measures to monitor the impacts of the construction and success of the restoration activities on the flora and fauna of the site. The monitoring program should include a schedule of progress reports, bi-monthly during construction and then 12 months, 24 months, and 36 months post construction.
- A survey of hollow-bearing habitat trees as well as nest/dormitory sites for the Grey-crowned Babbler will be required prior to the final design and construction of the internal road and facilities, to refine the footprint of these structures where possible to avoid these features. Data on the number of tree hollows lost could be used for developing a nest box replacement program to be implemented as part of the ecological restoration plan. The plan should detail the number and location of nest boxes to be placed on the site and target species, as well as suggestions for monitoring and maintenance.
- Install speed reduction measures along the internal access road, wildlife signage and sensor lighting to minimise disturbance from noise and lighting on nocturnal fauna, particularly the Squirrel Glider. The Restoration Plan should include landscaping along the road verges and disturbed edges of the development.
- Habitat on the site containing Spotted Gum (*Corymbia maculata*) has been identified as critical or essential foraging habitat for the Grey-headed Flying-fox (DECCW 2009), due to the fact that this tree species is productive during winter (May-Sept), at a time when food bottlenecks for flying foxes have been identified (Parry-Jones and Augee 1991 and Eby *et al* 1999). While the removal of Spotted Gum forest for this project was assessed as a non-significant impact for the long-term persistence of this species in the region, to further minimise potential impacts, it is appropriate to instigate a strategy that avoids removal during the winter, if possible. If not possible due to timing of approval, then aim for gradual removal of Spotted Gum to allow re-adjustment by foraging Grey-headed Flying-fox as a precautionary measure. The following approach is recommended:-

- If timing permits, avoid clearing the Spotted Gum / Ironbark Forest community during winter (May-Aug inclusive).
- If clearing is required in winter, then this should be staged such that other forest types are cleared first, or to avoid clearing large and mature Spotted Gum which are in flower until they cease flowering or as a final clearing activity. Juvenile trees can be cleared at any time. To achieve this, closely monitor the flowering of Spotted Gum on site during the winter period (note the flowering of trees may be unreliable from year to year and they may not flower at all). Identify flowering trees and any large and mature Spotted Gum by flagging prior to clearing. Continue monitoring of these during the clearing activity and remove these trees after flowering has ceased, or as a final clearing activity.
- If areas containing a high density of flowering Spotted Gum are identified, this habitat should be cleared gradually over several weeks, by removing approximately 25% of the area per week.

7.5.2 **Off-Setting Measures**

The ecological assessment undertaken above has identified the need to dedicate areas of land as off-sets for the loss of habitat for threatened species and endangered ecological communities.

- Proposed environmental off-sets should consider the principals as set out in DEWHA (2007). In this respect, the proposed offset site should aim to conserve a large area of remnant Spotted Gum (*Corymbia maculata*) and / or Forest Red Gum (*Eucalyptus tereticornis*), given their recognised value as important or critical foraging habitat for the Grey-headed Flying-fox.

7.5.3 **Measures to Minimise Impact of Key Threatening Processes**

- Weed management is to be developed as part of the on-site Environmental Management.
- Where possible, dead wood and dead trees would be relocated to adjacent areas of habitat.
- New watercourse crossings associated with the project need to meet NSW Fisheries Guidelines.

7.6 CONCLUSION

The majority of the study area supports remnant vegetation in a near natural condition, with the exception of introduced flora. Some disturbances are evident and associated with previous land uses. The condition of the EECs on site ranges from moderate to high providing habitat for a diversity of native flora and fauna species including rare and threatened species. Some areas of regenerating forest were also identified which are early stages of recovery of these EEC types.

As a result of the identified significance of the vegetation and fauna habitat on the site following the field survey, a range of avoidance and mitigation measures were proposed and adopted by the Pacific National in the early stages of the Project. The adoption of these recommendations has significantly reduced the initial and potential impacts of this project.

The assessments of significance concluded that the proposed Project in itself is unlikely to impose a 'significant impact' on local populations of threatened species, endangered communities or their habitats as listed under the TSC Act and EPBC Act, on the basis that the site will become isolated between the railway and the Hunter Expressway, and that these actions will reduce the connectivity, size and value of the habitats on site. However, the Project will contribute to the cumulative loss of habitat in the locality when added to the impacts expected from the approved Hunter Expressway and third railway. Therefore, it is appropriate to offset the impacts of the project through seeking compensatory habitat of similar condition and size that will not be impacted by the suite of proposed projects in this location. Further, the development and implementation of an Ecological Restoration and Management Plan for the degraded areas of the site demonstrates a commitment towards assisting the protection of threatened species habitat in the locality.

8 TRAFFIC AND ACCESS

8.1 INTRODUCTION

The Director-General's Requirements identified traffic and access as a key issue for the Environmental Assessment. This section identifies the potential traffic and access impacts of the Project for construction and operation, as well as the mitigation measures to reduce these impacts. Any residual impacts are also discussed where applicable. The management measures are further detailed in the draft SOC contained in Section 18. **Table 13** below outlines the Director-General's requirements and where they have been addressed in this report.

Table 13 Director-General's Requirements for Traffic and Access

DIRECTOR-GENERAL'S REQUIREMENTS	SECTION ADDRESSED
Access to, from and within the site (for all modes and needs).	Section 8.2 and 8.3.1
Interaction and integration with existing and planned transport infrastructure and services, including development of the Hunter Expressway and the <i>Hunter Valley (Rail) Corridor Capacity Strategy</i> (ARTC, 2009).	Section 8.3.8
A Traffic Impact Assessment, including a traffic analysis on major/relevant intersections and consideration of existing road constraints, for example, bridges.	Appendix B
Taking into account the <i>Guide to Traffic Generating Developments</i> (RTA, 2002).	Section 8.1.1

8.1.1 ASSESSMENT APPROACH

Better Transport Futures prepared a Traffic Impact Assessment (TIA) for the Project. The TIA took into account the *Traffic Generating Developments* (RTA, 2002). The TIA reviewed the traffic, access and parking implications for the proposed development. A copy of the TIA is contained in Appendix B.

8.2 DESCRIPTION OF EXISTING ENVIRONMENT

8.2.1 SITE ACCESS

Access to the site is via Mansfield Street, Greta. Traffic travelling to the site can approach Mansfield Street from two directions. The most likely direction is from the north from Nelson Street via the New England Highway. The New England Highway carries the majority of traffic through the Hunter Valley and provides a connection from Greta onwards to Newcastle via Maitland to the east and Singleton to the west. The New England Highway also provides an important connection between the Lower Hunter region located along the Golden Highway to the west and connections to the F3 and Sydney to the east. There is also the ability to access the site from the south via Camp Road, which connects Cessnock and Kurri Kurri.

New England Highway

The New England Highway through Greta provides a single lane of travel in both directions, with a parking lane along the westbound lane. A sealed shoulder is marked for cyclists along the eastbound lane. There are limited turn lanes and there is a signal controlled pedestrian crossing approximately 500 metres to the west of Nelson Street at Wyndham Street. The posted speed limit through Greta is 60 kilometres per hour. Each carriageway is in the order of 3.5 metres wide, with a sealed shoulder on the northern edge in the order of 1.5 to 2.0 metres wide. On the southern edge of the road, there is a 1.5 metre wide cycleway and a 2.5 metre wide parking lane. In the vicinity of the site, the New England Highway provides a straight alignment with good forward visibility in both directions. There are street lights provided along both sides of the road.

Observations on site show that during the peak periods, traffic flows along the New England Highway suffer from some delay due to the high volume of traffic. Due to the width of the New England Highway, through traffic movements can continue past traffic waiting to turn right into the various side roads, however, this causes some delays for the road movements.

Observations on site also show that traffic turning right out of the side roads can suffer from delays, but that with some platooning effect behind large vehicles this side road traffic can enter the flow on the New England Highway. It would also appear that drivers accept a smaller gap than normal in recognition of the high flows.

Nelson Street

Vehicles travelling to Mansfield Street from the New England Highway would use Nelson Street. Nelson Street is a local road that runs through Greta with a variety of land uses fronting the street, including commercial and residential. Nelson Street provides a single lane of travel in each direction with an overall width in the order of 12.5 metres with a marked parking lane to both sides. No pedestrian footpaths are present. Access to the New England Highway from Nelson Street is through a give way controlled intersection.

There are two bridges which must be crossed from Nelson Street to access the site via Mansfield Street, including a small wooden bridge over Anvil Creek, and the existing rail overpass bridge which is located just south of the Greta Railway Station. The approach to the railway bridge provides a tight 90% bend. It is understood that ARTC are proposing to upgrade this rail overpass as part of the third track. The upgrade would be undertaken to current RTA standards which would include pedestrian and bicycle facilities.

Camp Road

Secondary access is available to Mansfield Street from the south via Camp Road. Camp Road provides access to Cessnock to the south and Kurri Kurri to the south east. The road width narrows to around 9 metres at this point and there are no footpaths or sealed shoulders along its length. It operates under a speed limit of 60 km/hr.

8.2.2 TRAFFIC FLOWS AND VOLUMES

Traffic surveys for the New England Highway and Nelson Street were undertaken during peak periods. The survey results are provided below in **Table 14**.

Table 14 Traffic Survey Results (Source: Better Transport Futures, February 2010).

ROAD	LOCATION	DIRECTION	AM PEAK ¹	PM PEAK ¹	MID-BLOCK ROAD CAPACITY ²	LEVEL OF SERVICE (AM/PM)	VOLUME/CAPACITY AM	VOLUME/CAPACITY PM
New England Highway	East of Nelson Street	East bound	590	1422	1400	C/E	0.421	1.016
New England Highway	East of Nelson Street	West bound	963	610	1400	E/D	0.687	0.436
Nelson Street	South of New England Highway	North bound	144	121	900 ³	A/A	0.160	0.134
Nelson Street	South of New England Highway	South bound	108	191	900 ³	A/A	0.120	0.212

The survey results demonstrate that Nelson Street is currently operating well within its technical and functional capacity levels. It is carrying low traffic flows and there is plenty of spare capacity in this road for additional traffic. The New England Highway is operating at a poor level of service (E) which results in delays and congestion for road users. This is consistent with observations on site, which showed that traffic is heavy through Greta for the peak direction of flows with a near constant line of traffic.

Traffic data was also obtained from the RTA, indicating that the Annual Average Daily Traffic flow (AADT) in 2007 was in the order of 16,722 vehicles per day to the west of Branxton at Black Creek Bridge (approximately 1.7 kilometres west of Nelson Street) on the New England Highway. This data indicates that the AADT at this location has decreased slightly since 2001 at this location (being 17,098 in 2001).

8.2.3 PEDESTRIAN AND CYCLING FACILITIES

Cycling facilities within the locality are limited and inconsistent in their built form. For the majority of the length of the New England Highway, there are no cycle lanes marked, nor is there an off road footpath or shared path. In the vicinity of the site access off Mansfield Street, there are no cycle lanes, however, within Greta, cyclists can use the parking lanes where provided.

There are no pedestrian paths provided on Nelson Street and limited paths on the side of the New England Highway.

8.2.4 PUBLIC TRANSPORT

Public transport in the vicinity of the site is limited. School buses provide access for school children, however, there are no regular buses for general public use adjacent to the site. Hunter Valley buses service Greta via the New England Highway only, approximately 1 kilometre from the subject site.

The site is located adjacent to Greta railway station. CityRail provides a limited train service between Newcastle and Scone via Greta, with eight week day services passing through the station, comprising four to Scone and four to Newcastle. These services generally operate outside peak times. The only direct train from Newcastle to Greta in the morning peak leaves Newcastle at 8.12am and arrives at Greta at 8.59am. There are no afternoon peak services from Greta to Newcastle. Alternate train/bus combinations can take from 1 hour and 20 minutes to 2¼ hours depending on train and bus connections' times and locations.

Given the low frequency of trains servicing the site, it is considered that there will be no demand from the subject site from train access from work trips. The percentage of public transport trips in the Lower Hunter as a whole are very low, around 10% and it is considered that this rate would be even lower in the location of the subject site for work trips. Similarly, given the very infrequent bus service to the locality and the length of journey time, it is considered that no one will use the bus to access the subject site for work trips. It is therefore considered that all of the future employees on the site will travel by private vehicle to the subject site.

8.3 ASSESSMENT OF POTENTIAL IMPACTS

The following provides an assessment of potential traffic and access impacts associated with the Project including:-

- Site Access.
- Construction Traffic.
- Operational Traffic Generation and Distribution.
- Heavy Vehicle Use, Deliveries and Service Vehicles.
- Car Parking.

- Access to Public Transport.
- Access to Adjoining Properties.
- Interaction with Existing and Planned Infrastructure.

8.3.1 SITE ACCESS

There would be no changes to existing access arrangements to and from the site as a result of the Project. All vehicle access to the Project would be via the existing site access off Mansfield Street. A sealed access road would be constructed within the site to service the facilities within the Project. The driveway has been located to provide adequate visibility for vehicles entering and exiting the site.

Access arrangements within the Project allow it to accommodate light vehicle access for employee vehicles, as well as larger delivery vehicles including tri-axel semi trailers and/or B-doubles which would be used for fuel delivery. The facility has been designed to provide access both to and within the site for B-doubles. All vehicles would be able to turn around within the site to allow for entry and egress in a forward direction.

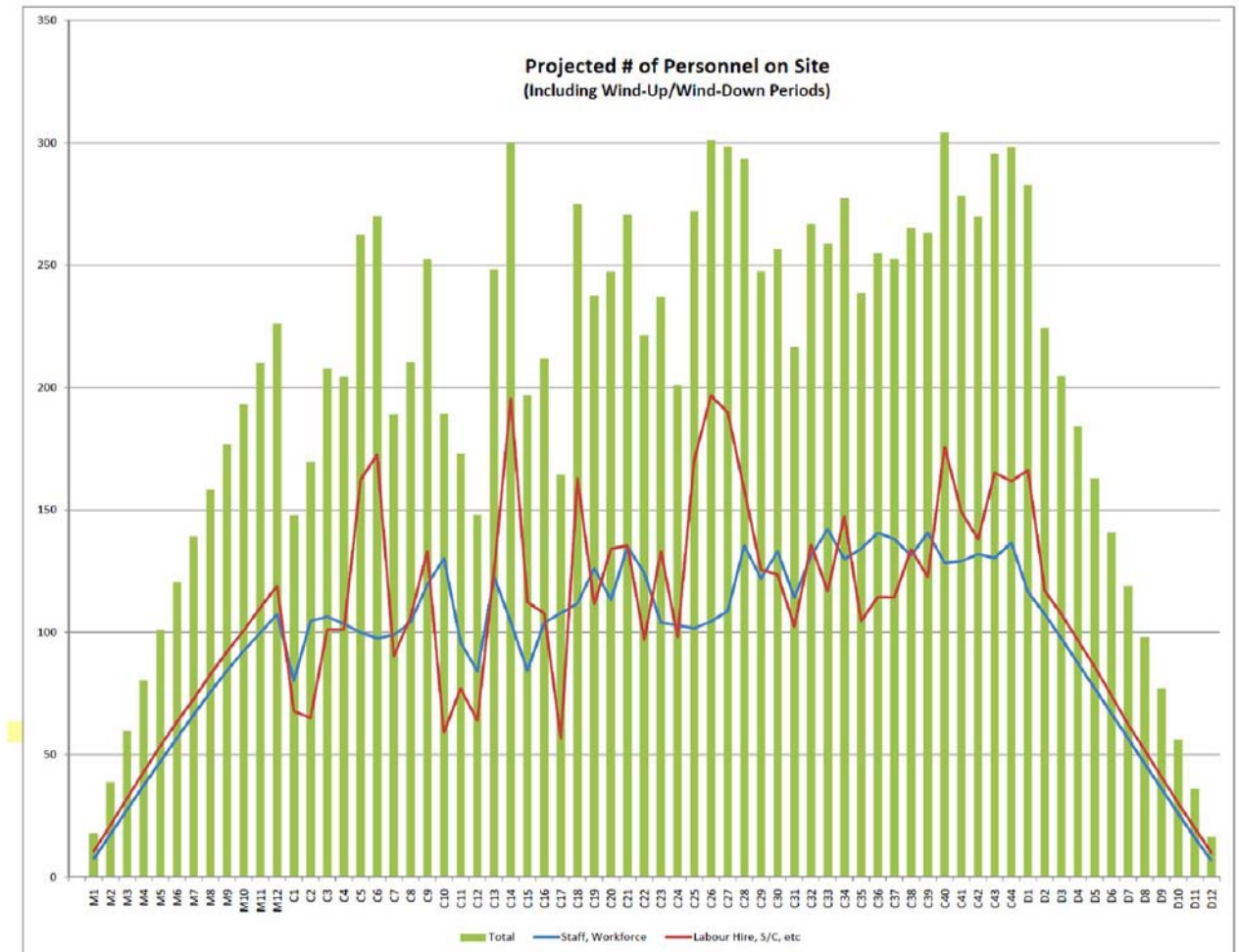
As part of the construction of the third railway track, it is understood that Nelson Street would be upgraded with a new alignment and railway crossing. This would remove the existing poor alignment over the railway line and the wooden bridge over Anvil Creek. ARTC are aware of Pacific National's requirements for access to the site, and it is understood that the proposed Nelson Street upgrade would not restrict any existing access arrangements to Mansfield Street.

8.3.2 CONSTRUCTION TRAFFIC

The primary short term impact to surrounding transport network infrastructure as a result of the Project would be during the construction phase. While the actual traffic numbers per day are unlikely to be significantly different from the operational traffic, it will be the concentration of movements at the beginning and end of the day that will differentiate the construction phase from the operation phase. The most significant impact is expected to be upon the intersection of the New England Highway and Nelson Street. During the construction phase over a 12 month timeframe, there would be an average of 50 workers on site in this time. However this would fluctuate with less workers on site in the early stages during bulk earthworks and increasing towards the end during building construction. To a lesser extent there will also be a number of vehicles associated with materials delivered to the site.

The following graph displays the expected construction personnel volumes of the life of the Project. The construction phase is detailed on the x axis while the number of workers on site is shown on the y axis.

Figure 14 Project Number of Personnel on Site



	MONTH	No. Personnel	Factor	Max #	# staff	Balance	Avg. deliveries per day	Total # of deliveries per month	Description / Comments
Design	Jun-10	49	0.75	37	10	27	1	22	Further geotech investigations, drilling gear.
	Jul-10	130	0.75	97	15	82	2	44	Further geotech investigations, drilling gear.
	Aug-10	202	0.75	151	20	131	3	66	Mobilisation starting, veg clearing equipment.
Construction	Sep-10	198	0.75	149	30	119	10	220	Cement & aggregate deliveries, earthmoving plant, concrete mixer trucks & pumps, etc.
	Oct-10	231	0.75	173	30	143	12	264	
	Nov-10	190	0.75	142	30	112	10	220	
	Dec-10	230	0.75	172	30	142	5	110	Lower numbers due to Christmas break.
	Jan-11	244	0.75	183	30	153	5	110	Lower numbers due to Christmas break.
	Feb-11	253	0.75	190	30	160	9	198	Fabricated steel deliveries, precast panels, building materials, craneage, other.
	Mar-11	263	0.75	197	30	167	6	132	
	Apr-11	260	0.75	195	30	165	7	154	
	May-11	259	0.75	194	30	164	7	154	Finishing works - major plant movements completed. Demobilisation starting. Mostly semi's and craneage.
	Jun-11	289	0.75	217	30	187	4	88	
	Jul-11	224	0.75	168	15	153	9	198	
Demob	Aug-11	130	0.75	98	10	88	6	132	Demobilisation. Mostly semi's and craneage.
	Sep-11	47	0.75	35	5	30	2	44	

While construction impacts will be short term, it is important to consider these impacts especially for the PM peak when there will be a high proportion of construction staff seeking to turn right out of Nelson Street onto the New England Highway. A traffic survey was undertaken to highlight hourly and daily variance in traffic flows for the New England Highway. The results of these surveys are summarised below:-

- The morning peak traffic demand was recorded between 6:00am and 7:00am, with a two-way flow of 1,314. The dominant flow was westbound with 1,098 vehicles (83.5%).
- The afternoon peak hour was between 4:00pm and 5:00pm with a two-way flow of 1,466 vehicles per hour, with the peak being eastbound (1,014 vehicles or 69.2%).

These results are displayed in the following figures.

Figure 15 Westbound Daily Variation in Traffic Flows (Source: Better Transport Futures, 2010).

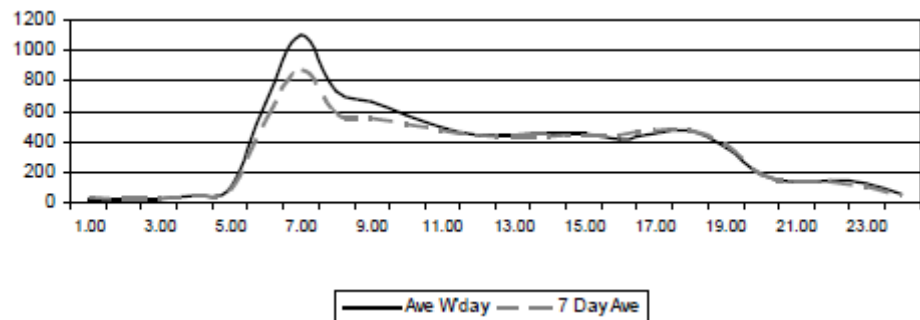
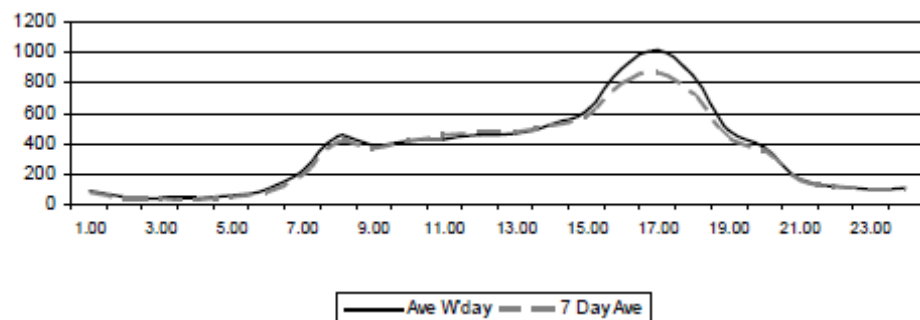


Figure 16 Eastbound Daily Variation in Traffic Flows (Source: Better Transport Futures, 2010).



The traffic data collected at the intersection of Nelson Street and the New England Highway shows that during the absolute peak period, the eastbound traffic movement is high and this creates considerable delay for vehicles turning right out of Nelson Street. However, the above data demonstrates that the traffic flow on the New England Highway drops off considerably outside of this afternoon peak period. The traffic data for the weekly survey shows that before 2:30pm and after 6:00pm the critical eastbound traffic flow reduces to 600 vehicles or less. This compares with the peak demand of 1,000 vehicles per hour.

During the peak demand for the eastbound traffic movement on the New England Highway, the westbound traffic movement is very low (at around 500 vehicles per hour) or less.

It can be seen that the major impact at the intersection of the New England Highway and Nelson Street will occur during the afternoon peak period, when there is limited capacity for the critical right turn out of Nelson Street. At this time, the left turn out of Nelson Street can occur with little if any impact upon the existing operation of this intersection. The majority of the traffic (some 90%) is considered to turn right out of Nelson Street and the remaining 10% will not create any delays.

Similarly, during the morning peak period the majority of the inbound traffic movements associated with the construction workers will be left turn in off the New England Highway into Nelson Street. This movement will not create any delays for traffic on the New England Highway as there is a left turn deceleration lane into Nelson Street.

From the above survey numbers, it can be seen that the critical issue remains the demand created by traffic wishing to leave the site and then turn right onto the New England Highway. To reduce the impact of the construction workers vehicles, exiting the site a number of mitigation measures are proposed which are contained in Section 8.4 below.

In the event that construction of the Project commences prior to ARTC's realignment of Nelson Street, construction vehicles would be required to utilise the existing wooden bridge over Anvil Creek or via Camp Road to the south to access the site.

It is likely that load limits apply to the Nelson Street wooden bridge however, these are currently unknown. Nelson Street and Camp Road currently take a variety of traffic including heavy vehicles, however, there is no sign advising of any load limit on the bridge.

As such, it is recommended that structural investigations be undertaken and discussions held with Council during the detailed design phase of the Project to determine the load limit for the Anvil Creek Bridge. In the event where construction vehicles would exceed the load limit on the bridge, the Traffic Management Plan would direct them to use alternative site access, such as via Camp Road. This is reflected in the mitigation measures proposed for the Project.

Other potential construction traffic impacts relate to potential cumulative impacts associated with ARTC's third track and the Hunter Expressway. These impacts are discussed below, however, are likely to be associated with an increase in the volume of traffic within the locality if construction of these three pieces of infrastructure occur concurrently in the vicinity of Greta.

It is considered that un-mitigated construction traffic may have an unacceptable impact on the performance of the intersection of the New England Highway and Nelson Street. This may lead to significant delays and consequently potential safety impacts. A number of measures have been proposed to mitigate this impact. Upon implementation of the mitigation measures recommended below, it is considered that the impact of construction traffic within the locality is acceptable.

8.3.3 OPERATIONAL TRAFFIC GENERATION AND DISTRIBUTION

The existing site is currently vacant, and as a result, generates negligible traffic flows. The Project would result in additional traffic within the locality. The level of traffic generated by the proposed development has been determined based upon the future staffing levels on site and their shift times. The nature of the development would lead to typical morning and afternoon peak traffic generation. Additional movements would occur at shift changeover in the evening. Traffic movements are spread over a number of hours due to staggered work hours and shift times.

The traffic flows below have been obtained from transport records for similar facilities operated by Pacific National. It is recognised that the type of development is unique and the RTA Guide to Traffic Generating Development does not provide any guidance for this type of specific use aside from the survey of similar type of development. This has been undertaken in this case.

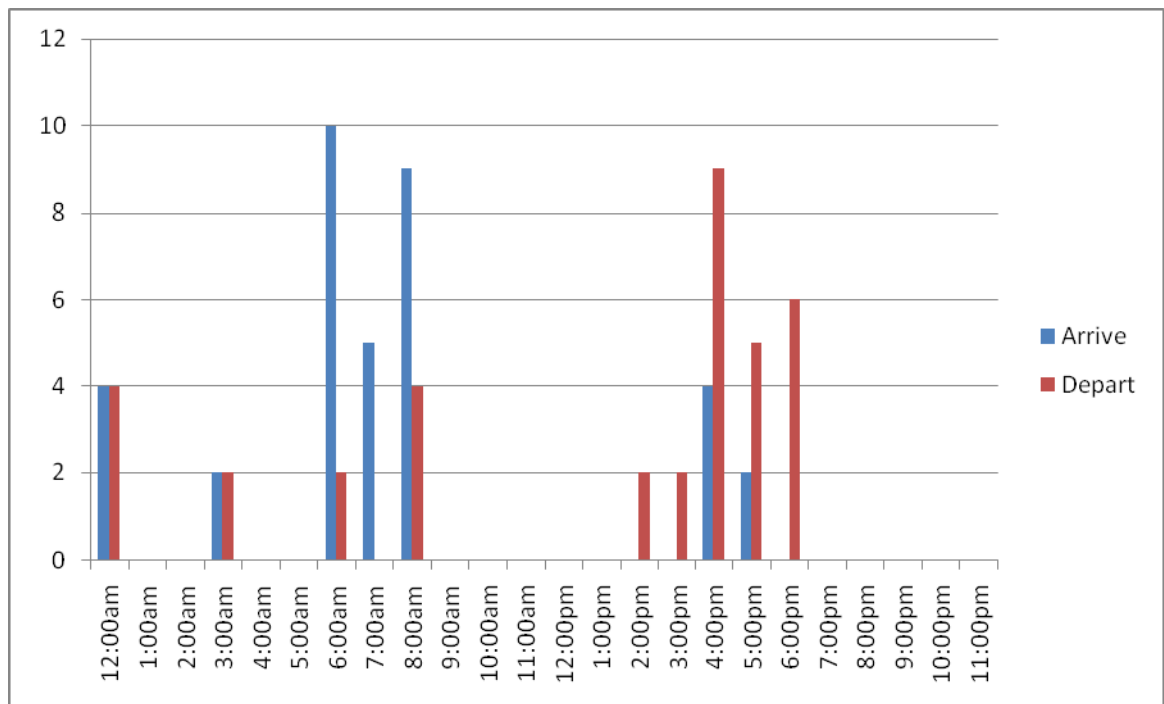
An important item is the spread of traffic to and from the site, due to the staggered work shift in site and the overlap between arrivals and departures. Thus stagger in shifts means that the impacts during peak times is reduced from an absolute peak which is typically experienced for industrial activities which all staff start and finish at the same time.

The following details the expected traffic distribution for Stages 1, 2 and 3.

Stage 1

The peak AM movement is expected to be between 6:00am–8:00am with 24 cars accessing the site, and the peak PM movement is expected to be between 2:30pm – 6:00pm with 24 cars leaving the site. Other movements would occur throughout the day and night however, these are not expected to be significant. Over a 24 hour period, there is expected to be 72 movements to and from the site associated with staff use. In addition to staff, there is expected to be visitors and contractors which would be random but generally during working hours (8:00am - 5:00pm). Staff traffic movements are detailed in the following graph.

Figure 17 Stage 1 Staff Traffic Distribution



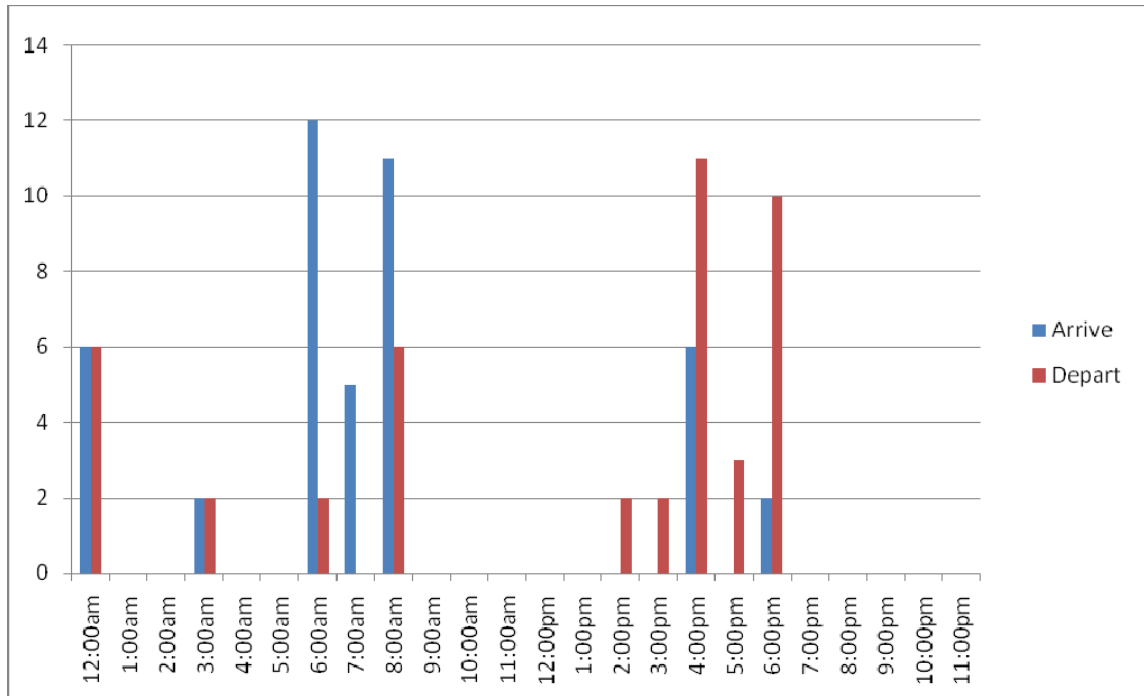
Additionally, some truck movements would occur during Stage 1 operations, as detailed below:-

- Provision of fuel to the site with truck movements = Average four to six per day (tri-axel semis and/or B-doubles).
- Provision of sand for provisioning activities = Average one to two per week.
- Removal of waste from the site, including garbage and used oil = Average four to six per week. This typically comprises a regular collection of garbage occurring twice weekly, plus additional weekly, monthly and bi-annual movements for other waste.

Stage 2

The peak AM movement is expected to be between 6:00am-8:00am with 28 cars accessing the site, and the peak PM movement is expected to be between 2:30pm – 6:00pm with 28 cars leaving the site. Other movements would occur throughout the day and night however, these are not expected to be significant. Over a 24 hour period there is expected to be 88 movements to and from the site associated with staff use. In addition to staff, there is expected to be visitors and contractors which would be random but generally during working hours (8:00am – 5:00pm). Staff traffic movements are detailed in the following graph.

Figure 18 Stage 2 Staff Traffic Distribution



Additionally, some truck movements would occur during Stage 2 operations, as detailed below:-

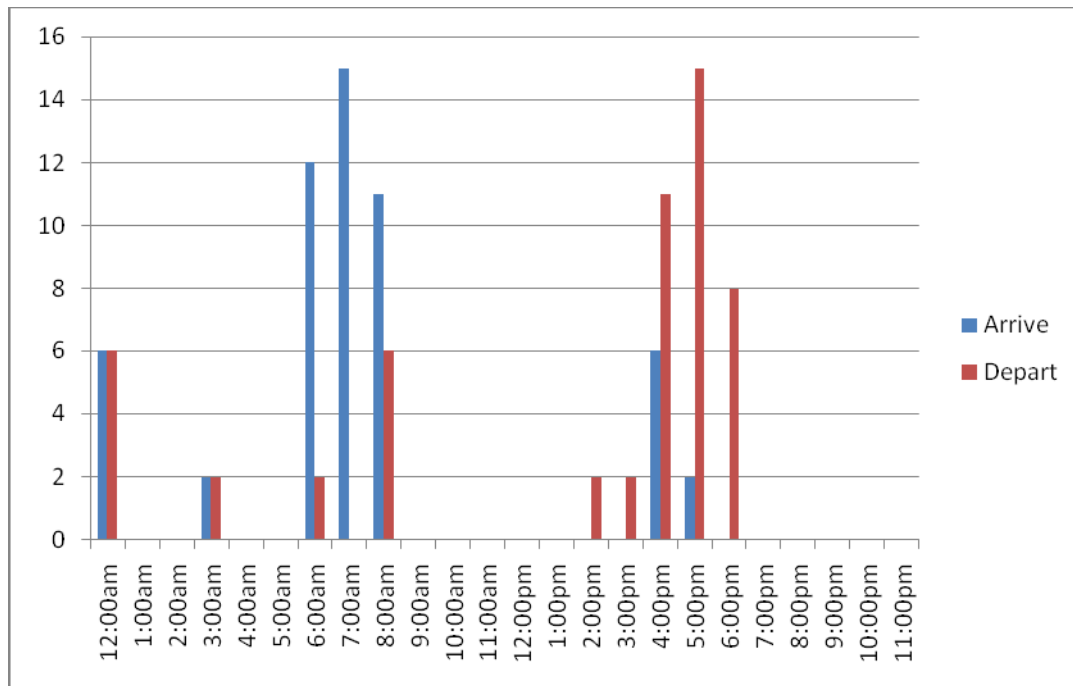
- Provision of fuel to the site with truck movements = Average six to seven per day (tri-axel semis and/or B-doubles).
- Provision of sand = Maximum two per week.
- Removal of waste from the site, including garbage and used oil = Average four to six per week. As per Stage 1, this typically comprises a regular collection of garbage occurring twice weekly, plus additional weekly, monthly and bi-annual movements for other waste.
- Provision and removal of spares for Locomotive and Wagon maintenance = maximum of one per week.

Stage 3

The peak AM movement is expected to be between 6:00am–8:00am with 38 cars accessing the site, and the peak PM movement is expected to be between 2:30pm – 6:00pm with 38 cars leaving the site. Other movements would occur throughout the day and night however, these are not expected to be significant.

Over a 24 hour period there is expected to be 108 movements to and from the site associated with staff use. In addition to staff, there is expected to be visitors and contractors which would be random but generally during working hours (8:00am – 5:00pm). Staff traffic movements are detailed in the following graph.

Figure 19 Stage 3 Staff Traffic Distribution



Additionally, some truck movements would occur during Stage 3 operations, as detailed below:-

- Provision of fuel to the site with truck movements = Average seven to nine per day (tri-axel semis and/or B-doubles).
- Provision of sand = Maximum two per week.
- Removal of waste from the site, including garbage and used oil = Average four to six per week.

As per Stage 1, this typically comprises a regular collection of garbage occurring twice weekly, plus additional weekly, monthly and bi-annual movements for other waste.

- Provision and removal of spares for Locomotive and Wagon maintenance = Maximum one to two per week.

Intersection of New England Highway/Nelson Street

For the purposes of undertaking the TIA, it was considered that the majority of light traffic associated with the development would have an origin/destination towards the New England Highway. It was also considered that traffic in the main would have an origin/destination towards the east of the site towards Maitland and Newcastle. It was considered that just 10% of the traffic associated with the development will access the site from the south. This equates to approximately three to four vehicles per hour during the peak time. The volume of traffic will have a negligible impact upon the operation of Mansfield Street.

It is proposed to use tri-axel semi-trailers or B-doubles to deliver fuel to the site. B-doubles may be used for fuel delivery however this is subject to the designation of a suitable access route for B-doubles along with any consent requirements. It is recognised that Nelson Street and Camp Road are currently not designated B-double routes. Until Nelson Street is upgraded, all heavy vehicle access will be via Camp Road. Truck movements would have negligible impact upon the operation of this road, at its northern end, adjacent to the New England Highway, Nelson Street (which runs into Camp Road), is carrying less than 300 vehicles per hour during the morning peaks in the week. Weekend flows would be much lower than this, showing that the operation of Camp Road would remain well within an acceptable level of service to the south of the site.

The additional traffic flows are predicted to have a minimal impact upon traffic safety of the surrounding roads, as the flows are well within acceptable limits on the adjacent road networks. The major impact will be at the intersection of the New England Highway and Nelson Street. As discussed above, the New England Highway currently suffers from poor level of service. During morning peak periods the impact is expected to be negligible as vehicles would make a left turn from the New England Highway. During the afternoon period most traffic associated from the Project would make a right turn out of Nelson Street onto the New England Highway.

The following table details the Sidra Analysis for the existing situation as a result of the Project for the New England Highway and Nelson Street AM/PM peak.

Table 15 Sidra Analysis for the existing situation for the New England Highway and Nelson Street AM/PM peak (source: Better Transport Futures, February 2010).

APPROACH	LOS	DELAY	95 TH PERCENTILE QUEUE
Nelson Street South	C / D	33.5 / 45.8	19 / 17
New England Highway East	A / C	4.4 / 32.0	66 / 117
Nelson Street North	B / F	19.7 / 88.1	0 / 1
New England Highway West	A / B	9.1 / 15.1	51 / 169
Overall	A / A	8.6 / 21.4	66 / 169

Notes: AM/PM Peak

The above results confirm the site observations that there are no delays for through movements. However, whilst the Sidra Analysis shows considerable delays and queues for the turning movements, observations indicate that the delays/queues are considerably lower. This is attributed to driver drive behaviour in this location.

The same analysis was completed for the morning and afternoon peak periods, with the additional development flows added. It was assumed that an extra nine vehicles would enter and exit Nelson Street from the east, and an extra one would enter/exit Nelson Street from the west. The results are presented in the following table.

Table 16 Sidra Analysis for the proposed situation for the New England Highway and Nelson Street AM/PM peak 2009 base plus Stage One of the Development (source: Better Transport Futures, February 2010).

APPROACH	LOS	DELAY	95 TH PERCENTILE QUEUE
Nelson Street South	C / F	33.9 / 72.5	19 / 31
New England Highway East	A / C	4.5 / 32.0	66 / 116
Nelson Street North	B / F	19.8 / 88.1	0 / 1
New England Highway West	A / B	9.3 / 15.1	51 / 169
Overall	A / A	8.7 / 23.1	68 / 169

Notes: AM/PM Peak

The results above confirm that the additional traffic flows associated with the Project would have a minimal impact upon the overall operation of the intersection of Nelson Street and the New England Highway. The analysis shows however, that the critical right turn out of Nelson Street onto the New England Highway would deteriorate with delays increasing. The queue for this right turn movement could increase although it is likely that the actual queue times would be less due to driver behaviour at this location which indicates that drivers may accept a smaller gap in the traffic, as well as platooning evident on the New England Highway.

Normal RTA requirements provide for a 10 year growth scenario for background traffic flows. Information provided by the RTA shows the following future AADT along the New England Highway at Greta as a result of the Hunter Expressway:-

- **2016:** 8,000 – 9,000 AADT
- **2026:** 11,000 – 12,000 AADT
- **2031:** 13,000 to 14,00 AADT

A review of the RTA count data shows that in 2004 the AADT on the New England Highway at the eastern edge of Branxton was 18,325. As such, it can be seen that the AADT would reduce significantly following the commission of the Hunter Expressway. Advice from the RTA indicates that the Hunter Expressway will be open by 2014. This means that Stage 1 traffic flow for the Project would remain as per the current situation.

By the time Stage 2 is commissioned, the Hunter Expressway would be operational and traffic flows along this section of the New England Highway would have reduced significantly compared to the current situation. Using the future traffic flows predicted by the RTA, Sidra analysis has been undertaken for 2020, allowing through traffic movements on the New England Highway to reduce by some 8,000 vehicles per day or some 44% (18,500 current AADT and 10,000 AADT in 2020). This is detailed below.

Table 17 Sidra Analysis for 2020 Situation of the New England Highway and Nelson Street AM/PM peak (Source: Better Transport Futures, February 2010).

APPROACH	LOS	DELAY	95 TH PERCENTILE QUEUE
Nelson Street South	B / A	14.7 / 14.4	19 / 17
New England Highway East	A / A	1.6 / 7.2	66 / 117
Nelson Street North	A / B	11.7 / 22.0	0 / 1
New England Highway West	A / A	4.3 / 4.0	51 / 169
Overall	A / A	4.3 / 5.8	66 / 169

Notes: AM/PM Peak

The above analysis confirms that for 2020 the operation of the intersection is at acceptable levels due to the significant reduction in traffic movements along the New England Highway following the commissioning of the Hunter Expressway.

It is considered that there are no external road works required as a consequence of the Project, apart from the planned upgrade of the Nelson Street rail overpass, which is understood to be proposed to be undertaken by ARTC as part of the third track. It is expected that with the opening of the Hunter Expressway in January 2019, the traffic flows along the New England Highway in Greta would reduce significantly and the existing road network would operate to a much higher standard.

Intersection of Nelson Street/Mansfield Street

It is useful to consider the Ausroads threshold for intersection capacity under uninterrupted flow conditions. Table 4-4 in Appendix B details these conditions. Where traffic flows fall within these limits, intersection operation is essentially at no delay of interruption for approaching drivers. The two way flows along Nelson Street is 252 in AM peak and 312 in PM peak, thus indicating that some 250 vehicles could use the side road with no delay to all road users. There is no requirement to complete any intersection modelling work at this intersection.

8.3.4 HEAVY VEHICLE USE, DELIVERY AND SERVICE VEHICLES

The proposed distribution of vehicles, including heavy vehicles is discussed above. At present, there is minimal heavy vehicle usage of Nelson Street.

There is some use by Council garbage collection vehicles and limited access for local deliveries etc. The Project would introduce some additional heavy vehicles movements to Nelson Street, including tri-axel semi-trailers and/or B-doubles. B-doubles may be used for fuel delivery during Stage 1, and subsequent, operations however this is subject to the designation of a suitable access route for B-doubles along with any consent requirements. It is recognised that Nelson Street and Camp Road are currently not designated B-double routes. Designation of Nelson Street and/or Camp Road as B-Double routes would be progressed through a separate application to Council and the NSW RTA.

In addition to fuel deliveries, service vehicles would access the site for delivery of materials, as well as removal of waste. Due to the nature of site operations, no dedicated service area would be provided as part of the Project. The site has been designed with suitable access heavy vehicles and hardstand areas would be provided within the site for service vehicles where required.

8.3.5 CAR PARKING

The Project would provide off street car parking for employees, contractors and visitors with the provision of approximately 80 car parking spaces. It is proposed to locate the main car park adjacent to the administration facility with a provision of 75 car parking spaces, and two smaller secondary car parks adjacent to the provisioning facility and locomotive maintenance centre with two and three car parking spaces respectively. As discussed in Section 3, the administration centre would not be constructed until Stage 2 however, the main car park would be constructed as part of Stage 1 works. The highest parking demand for the Project would occur following completion of Stage 3 with a peak demand of around 38 car parking spaces for staff during day shift. Additional spaces would be required for contractors and visitors however, these are expected to be minimal.

The *RTA Guide to Traffic Generating Development* (RTA Guide) and the Cessnock City Council Development Control Plan (DCP) for car parking requirements do not provide any guidance for parking demands for Train Support Facilities.

The RTA Guide advises surveys of similar types of development, however, this is not applicable for the Project due to the lack of directly comparable sites. It is therefore considered appropriate to review the parking demands against the staffing numbers for the Project.

Overall, it is considered that the Project provides an acceptable level of on-site parking to meet expected demand. Further information of parking demand and provision for the Project can be found in Appendix B.

8.3.6 ACCESS TO PUBLIC TRANSPORT

Due to the nature of the Project, including proposed shift times, and the infrequent public transport services on offer, it is considered that public transport patronage would be low. As such, it is considered that no additional access would be required for public transport.

8.3.7 ACCESS TO ADJOINING PROPERTIES

The Project would have minimal impact upon adjacent properties. Access to existing adjacent properties would be maintained as a result of this development.

8.3.8 INTERACTION WITH EXISTING AND PLANNED TRANSPORT INFRASTRUCTURE

Hunter Expressway

As discussed in Section 2, the site is adjacent to the planned extension of the F3 Freeway from Seahampton to Branxton. The Hunter Expressway would connect with the New England Highway to the west of Branxton and is expected to reduce the volume of traffic using the New England Highway through Greta by around 30%. Advice from the RTA indicates that the modelling work completed to date indicates that the through traffic movements along the New England Highway will be reduced in the order of 30% or more over the current flows.

It can be seen that the current traffic flows along this section of the New England Highway currently suffer from delays and operate at a poor level of service.

The existing level of service during the morning peak period for westbound traffic on the New England Highway is E.

This level of service is not desirable, hence the reason why the road authority has identified the fact that a significant road upgrade is required in the form of the Hunter Expressway. However, until this upgrade is provided, the road authority and road users will have to accept the poor level of service and associated delays. The RTA has been working on this project for a number of years and funding has now been committed to this project.

Advice from the RTA indicates that the Hunter Expressway will be operational by 2014. As detailed in Section 6 of this report, a meeting was held on 14 January 2010, with the NSW RTA to discuss the Project in the context of the Hunter Expressway.

The Project has been designed with consideration of the design of the Hunter Expressway, including bulk earthworks and site levels. The design of the Project would not conflict with the Hunter Expressway.

There may be a cumulative impact in the event that construction of the Project and the Hunter Expressway overlaps. This would occur as a result of increased construction traffic. It is expected that any cumulative impact would be minimal and short term only as construction of the third track and associated infrastructure would be transient as it moves along the linear infrastructure. A number of mitigation measures are discussed below to minimise any potential cumulative impact which would be discussed further with the RTA. There may be opportunity to minimise the cumulative impact through such measures as co-location of construction compounds. These opportunities would need to be considered by the contractor in a traffic management plan prepared for the Project.

There is a restriction on the title of the site which restricts access from the site to the Hunter Expressway, and it is not proposed to vary this as part of the Project. During the operation phase of the Project, there would be no interaction with the Hunter Expressway.

Hunter Valley (Rail) Corridor Capacity Strategy

The *Hunter Valley (Rail) Corridor Capacity Strategy* (ARTC, 2009) (HVRCCS) discusses the construction of a third rail track between Maitland and Minimbah. Work is currently progressing on this project with a Preliminary EA lodged with DOP in May 2009.

The provisioning tracks servicing the Project would join the existing network using the proposed third track.

The physical works required to allow connection of the Project to the existing network is included as part of this Project, however, the servicing agreement would be undertaken as a separate process pursuant to the *Transport Administration Act 1988*.

As part of the construction of the third track between Maitland and Minimbah, it is understood that ARTC are proposing to upgrade Nelson Street to remove the current poor alignment over the railway. The road re-alignment would improve the existing situation and remove the two existing tight bends over the railway line, as well as replace the current narrow road bridge over Anvil Creek. It is understood that to meet current RTA standards pedestrian and cycle facilities would be required to be provided over the new alignment.

As detailed in Section 6 of this report, Pacific National has discussed the project with ARTC. ARTC are aware of Pacific National's requirements in relation to access to their site and how the design of the new bridge needs to consider access for Pacific National to their site. The design of the new rail overpass would not restrict access to the site or any turning movements between Nelson Street and Mansfield Street.

Similarly to the Hunter Expressway, there may be a cumulative impact in the event that construction of the Project and the Hunter Expressway overlaps. The two projects would need to coordinate during the earthworks stage of construction. It is important to note that the earthworks stage represents the construction phase of the Project with minimal staff on site compared to later construction works, this would assist in managing the cumulative traffic impact. Further, as discussed above, it is expected that any cumulative impact would be minimal and short term only as construction of the third track and associated infrastructure would be transient as it moves along the linear infrastructure. Notwithstanding, a number of mitigation measures are discussed below to minimise any potential cumulative impact as a result of construction activities. These opportunities would need to be considered by the contractor in a traffic management plan prepared for the Project.

8.3.9 SUMMARY

The following table provides a summary of traffic impacts associated with the Project.

Table 18 Summary of Traffic Impacts

TRAFFIC CONDITIONS	FUTURE TRAFFIC FLOWS	OPERATION OF INTERSECTION OF NELSON STREET AND NEW ENGLAND HIGHWAY	REASON FOR LEVEL OF SERVICE	CONSTRUCTION TRAFFIC ASSUMPTIONS	COMMENT
Existing traffic flows with no development traffic	300 maximum	A overall for intersection. D for Nelson Street south of New England Highway.	High traffic flows along New England Highway restrict access for traffic turning right out of side roads.		
Existing traffic flows plus development traffic AND uncontrolled management of traffic from subject site	300 per week giving 50 per day, based upon contractors estimate of staff numbers. Note assumes all employees drive separately to site	Level of service of A overall BUT F for the right turn out of Nelson Street.	High traffic flows along New England Highway restrict access for traffic turning right out of side roads. Minimal capacity for any additional right turns during the afternoon peak period.	95% of traffic if unmanaged is expected to turn right out of Nelson Street during peak period	Need to avoid right hand turn out of Nelson Street by construction traffic during peak period 3.30 pm and 6.00 pm
Existing traffic flows plus development traffic AND uncontrolled management of traffic from subject site	50 per day as detailed above.	A overall for intersection. D for Nelson Street south of New England Highway.		Right turn out of Nelson Street managed for construction traffic	Intersection operation unaffected.
Notes	Management of afternoon construction traffic between 3:30 and 6:00 pm includes	- Staggered release of traffic that will use Nelson Street from site – 5 cars every 5 minutes. - Immediate release of vehicles from the site that will use Camp Road and avoid the intersection of Nelson Street and New England Highway. - Monitoring of Intersection to ensure cars that have been identified as being on the Pacific National site do not turn right out of Nelson Street during the peak period. - All heavy vehicles to access the site via Camp Road.			
Mitigation	Avoid right turn from Nelson Street in afternoon Peaks	- SIDRA analysis showed that the high through traffic flows along the New England Highway in the peak periods is the main cause for delays for side road at the intersection. - Remaining options of turning left into New England has minimal impact on traffic flows during critical afternoon peak period.			

TRAFFIC CONDITIONS	FUTURE TRAFFIC FLOWS	OPERATION OF INTERSECTION OF NELSON STREET AND NEW ENGLAND HIGHWAY	REASON FOR LEVEL OF SERVICE	CONSTRUCTION TRAFFIC ASSUMPTIONS	COMMENT
		- Overall contribution of traffic to the New England Highway is negligible. - Avoiding right hand turn from Nelson Street in afternoon Peaks will maintain current level of service of intersection.			
Management of right hand turn from Nelson Street	Identification of cars and traffic marshals	- All cars on the Pacific National site will be clearly identified through semi permanent marker such as a sticker. - Car makes and models and registration will be recorded. - Traffic Marshals will be at the gate of the construction site and also at the intersection of Nelson Street and New England Highway. - Any cars found to be turning right out of Nelson Street during peak periods that come from the Pacific National site will be identified and reported under OH&S requirements as undertaking an unsafe action. - All employees on site will be educated of this matter through normal OH&S management such as tool box meetings, signs and inductions.			

8.4 MITIGATION MEASURES

8.4.1 CONSTRUCTION

A Construction Traffic Management Plan (CTMP) should be prepared to manage construction traffic for the Project. The CTMP could include such measures as:-

Alter the hours of work on site so that staff movements in and out of site would be completed outside of peak hours. This would mean work commencing on site at 7:00am and finishing after 6:30pm at night.

Make available a copy of the CTMP for staff and contractors. To reduce the impact of the construction workers vehicles, the following arrangements are recommended to be contained within the CTMP:

- Workers travelling by private car are to turn right on Nelson Street and use the road to Lovedale to avoid using the critical junction with the New England Highway. This route is considered satisfactory and appropriate for many destinations further to the east such as Kurri Kurri, Lake Macquarie and Newcastle.

- Stagger the release of cars from the site that still need to use the New England Highway / Nelson Street intersection, 10 cars every five minutes.
- Ensure that cars leaving the site that use the Nelson Street intersection turn left before using intersections further west to turn around to head back to Maitland. (This arrangement has been previously recommended as a suitable temporary form of traffic management of the subject site).

In addition to the above the following could also assist in improving traffic management under the temporary conditions created during project construction:-

- Employees' cars could be clearly physically identified combined with recording number plates and car details (if required).
- A traffic monitoring crew could be employed between 4:30pm and 6:00pm.
- Monitors would ensure that cars leave the site at staggered time intervals, 10 cars every five minutes.
- Monitor the intersection of Nelson Street and ensure that no vehicles identified from the PN site would be turning right out of Nelson Street.

The above control of employees' vehicles could form part of the site's OH&S System and in particular the Construction Management Plan as a means of ensuring that people are educated regarding the purpose of controlling traffic movements after leaving the site. It could also provide a mechanism for issuing a non compliance under the OHS system or CTMP if vehicles are identified turning right out of Nelson Street in the nominated PM peak period on the New England Highway.

Prior to the commencement of construction work on site, a Construction Traffic Management Plan (CTMP) will need to be prepared and submitted for review and approval by the RTA.

It is considered that these options should be discussed with the RTA during preparation of the TMP. There may also be opportunity to manage the cumulative construction impacts through measures such as co-locating construction compounds on site.

In the event that construction of the Project commences prior to ARTC's realignment of Nelson Street, construction vehicles would be required to utilise the existing wooden bridge over Anvil Creek to access the site. It is likely that load limits apply to this bridge however, these are currently unknown. As such, it is recommended that structural investigations be undertaken and discussions held with Council during the detailed design phase of the Project to determine the load limit for the Anvil Creek Bridge.

In the event where construction vehicles would exceed the load limit on the bridge, the Traffic Management Plan would direct them to use alternative site access, such as via Camp Road.

8.4.2 OPERATION

The analysis above concludes that the level of impact of the Project on the existing transport network is acceptable, especially following Stages 2 and 3 when the Hunter Expressway would be operation.

Consequently, no upgrades to existing infrastructure would be required. To mitigate the short term impacts associated with Stage 1 (i.e. until the Hunter Expressway is commissioned), it is recommended that a Traffic Management Plan (TMP) be prepared for Project operations. The TMP could include the following measures to discourage and reduce the number of vehicles exposed to the Nelson Street and New England Highway intersection during the peak PM period:-

- Where possible, limit materials delivery, including fuel, to be outside of peak hours but within daylight hours.
- Promote car pooling and shared vehicles trips for day shift workers.
- Encourage staff to utilise Camp Road when leaving in the PM peak period.

8.5 CONCLUSION

The primary impact to surrounding transport infrastructure as a result of the Project would be during the construction phase as the employee numbers would be much higher than during operation.

Whilst a number of mitigation measures have been put forward to reduce these impacts, it is recommended that further discussions be held with the RTA to assist in the management of construction traffic. This is especially relevant to the potential cumulative impact that would arise in the event that the Project was constructed at the same time as the Hunter Expressway. It is important to note that these construction impacts are short term only.

As such, it is considered that there will be minimal residual impacts on the surrounding transport network. Some residual impacts may result as a result of cumulative construction traffic impacts in the event that construction of the Project occurs at the same time as construction of the Hunter Expressway and ARTC's third track and associated infrastructure. The TMP would address this and aim to mitigate any potential impact.

The analysis found that traffic flows associated with the development would have a minimal overall impact upon the operation of the intersection of the New England Highway and Nelson Street.

Similarly, the overall operation of the New England Highway in this location will remain as per existing conditions. For Stage 1 of the Project, and prior to the commission of the Hunter Expressway, there could be increased delays and queues for traffic turning right out of Nelson Street during the afternoon peak period.

The observations on site indicate that due to the platooning effect of traffic movements, the actual delays and queues at this location are likely to be less than those predicted by the modelling. Further, traffic data from the RTA shows that future traffic flows on this section of the New England Highway would reduce by 30% or more following the commission of the Hunter Expressway. Thus, the future demand of the Project would be acceptable. The Project would not impact on any existing access arrangements. As discussed above, it is recommended that to mitigate the short term impacts associated with Stage 1 (i.e. until the Hunter Expressway is commissioned), a Traffic Management Plan (TMP) should be prepared for Project operations which contains measures to discourage and reduce the number of vehicles exposed to the Nelson Street and New England Highway intersection during the peak PM period. Following implementation of this TMP it is considered that there would be no significant residual impacts associated with the operations of the Project.

9 NOISE AND VIBRATION

9.1 INTRODUCTION

The Director-General's Requirements identified noise and vibration as a key issue for the Environmental Assessment. This section describes the existing environment in relation to noise and vibration. It also identifies the potential noise and vibration impacts of the Project for construction and operation, as well as the mitigation measures to reduce these impacts. Any residual impacts are also discussed where applicable. The management measures are further detailed in the draft SOC contained in Section 18. **Table 19** below outlines the Director-General's Requirements and where they have been addressed in this report.

Table 19 Director-General's Requirements for Noise and Vibration

DIRECTOR-GENERAL'S REQUIREMENTS	SECTION ADDRESSED
Noise and vibration from all activities and sources on and off site and impacts to receivers.	Section 9.2
The noise assessment must consider the impact from the project in isolation and in a cumulative context with relevant existing and approved development, including development of the Hunter Expressway and the third railway line between Maitland and Minimbah.	Section 9.3 including Section 9.3.2
Taking into account the <i>NSW Industrial Noise Policy</i> (DECC, 2000), the <i>NSW Environmental Criteria for Road Traffic Noise</i> (EPA, 1999) and <i>Interim Construction Noise Guideline</i> (DECC, 2009).	Section 9.1.1 Appendix C

9.1.1 ASSESSMENT APPROACH

Advitech prepared an acoustic assessment for the Project taking into account *NSW Industrial Noise Policy* (DECC, 2000), the *NSW Environmental Criteria for Road Traffic Noise* (EPA, 1999) and *Interim Construction Noise Guideline* (DECC, 2009). A copy of this report is provided in Appendix C.

Advitech also prepared a Blast and Vibration Impact Assessment in accordance with the Assessing Vibration: a technical guideline (NSW Department of Environment and Conservation). A copy of this report is provided in Appendix D.

The potential impacts of both noise and vibration were assessed by first assessing the existing noise environment and considering this against the potential noise impacts generated by the facility. This process involved:-

- Establishing unattended noise loggers in six locations.
- Undertaking attended noise monitoring at the unattended logging locations to characterise sources in each of the receiving noise environments.
- Undertaking attended vibration monitoring at the nearest sensitive receiver to the proposed development.
- Assessment of the noise monitoring data in accordance with guidelines established in the Industrial Noise Policy to remove invalid data and its extraneous impacts.
- Establishment of the Project's specific noise levels and vibration goals for the construction and operation of the Support Facility with reference to the relevant publications.

Consideration was given to approved and proposed off-site developments that are likely to alter the ambient noise environment in the area adjacent to the site.

In assessing the potential noise impacts, the collected information was used to identify the principal noise and vibration sources for the development, both during the construction and operational stages. This information was then used in an environmental noise model to predict the noise impacts on adjacent sensitive receivers, in both neutral and worst case meteorological and operational conditions. This data was presented as impact contours in the receiving environment.

9.2 DESCRIPTION OF EXISTING ENVIRONMENT

The existing noise environment in Greta is of a rural nature with the existing sensitive receivers subject to the influence from the passage of trains, both coal and commuter, on the Main Northern Railway as well as vehicular traffic on the New England Highway. The background noise environment is dominated by these transportation sources. The locality of Greta is subject to significant change over the next five to ten years which will provide a different noise environment to that currently in Greta. The significant projects that may generate increasing background noise levels will include:-

- Development of the Hunter Expressway to Branxton which was recently given funding by the Federal Government.
- The development of the third railway line between Maitland and Minimbah, which is currently undergoing environmental assessment with construction expected to commence in August next year.
- Urban expansion projects at North Rothbury, Anvil Creek and the north eastern extents of Greta.

A number of potentially sensitive noise receivers were identified adjacent to the proposed development site including residential receivers including:-

- To the east at Greta.
- To the south-east at Illalong.
- To the south off Tuckers Lane.
- To the west at North Rothbury.
- To the north-west at Branxton.
- To the north off the New England Highway.

A number of noise sensitive non-residential receivers were also identified within the receiving environments adjacent to the proposed development. These receivers are identified as:-

- Greta Public School (Wyndham Street).
- Greta Community Pre-school (Water Street).
- Greta Arts and Sports Community Hall (Water Street).
- Various commercial receivers on the New England Highway.

These are shown in **Figure 20**. The nearest sensitive receivers with potential to experience vibration impacts are located to the south of the site on Mansfield Street, Illalong.

Figure 20 Location of Sensitive Receivers (Source: Advitech, 2010)



NOISE

Noise loggers were placed at these sensitive receiver locations. A summary of Project specific noise levels (PSNL) is present below in **Table 20**.

Table 20 Summary of Project Specific Noise Levels, dB(A)

RECEIVING ENVIRONMENT	RECEIVER ID	DAY	EVENING	NIGHT	SLEEP DISTURB.
Greta	R1	45	44	37	47
Illalong	R2	40	42	37	47
Tuckers Lane	R3	37	45	40	51
North Rothbury	R4	39	39	35	45
Branxton	R5	44	44	37	47
New England Highway	R6	48	48	38	48

The results from attended and unattended background monitoring indicate that the existing noise environment is dominated by road traffic on the New England Highway, and rail traffic on the Main Northern Railway. As noted above, a number of significant infrastructure projects are proposed (or have been approved) that are likely to alter the character of the receiving environments. Consequently, the character of the noise environment at this location, particularly background noise levels, is likely to change. The receiving noise environments adjacent to the Project are characterised by a mix of urban, suburban and rural receiver types, depending on the proximity to transportation corridors.

VIBRATION

Vibration monitoring was to characterise ambient vibration impacts at the site of the proposed development. Monitoring was undertaken using a Texcel UMX (S/N:721) vibration analyser. A summary of the monitoring results is presented in **Table 21** while the data provided in **Table 22** summarises the range of Root Mean Square (RMS) acceleration values from monitored pass-by events.

Table 21 Summary of Pass-By Events

EVENT/ID	PASS-BY DURATION (SECONDS)	DESCRIPTION
T1N	150	Northbound Coal (unladen)
T2N	50	Northbound Countrylink Passenger Train
T3N	120	Northbound Coal (unladen)
T4N	180	Northbound Coal (unladen)
T5N	160	Southbound Coal (laden)
T6N	90	Southbound Coal (laden)
T7N	135	Southbound Coal (laden)
T8N	105	Southbound Coal (laden)

Table 22 RMS Acceleration Values from Monitored Pass-by Events

RANGE OF VALUES		RMS ACCELERATION (MS ⁻²)		
		RADIAL	TRAVERSE	VERTICAL
Northbound (unladen)	Minimum	0.0006	0.0006	0.0003
	Maximum	0.0112	0.0116	0.0225
Southbound (laden)	Minimum	0.0006	0.0006	0.0003
	Maximum	0.0094	0.0100	0.0091
Background	Minimum	0.0006	0.0006	0.0003
	Maximum	0.0009	0.0006	0.0006

The estimated partial VDV (eVDV) values for each of the monitoring rail pass-by events, was calculated and the results are presented in **Table 23**. Bold values indicate the axis on which maximum eVDV were observed.

Table 23 eVDV Values for Each Pass-by Event

EVENT/ID	TOTAL EVDV	PARTIAL EVDV		
		RADIAL	TRANSVERSE	VERTICAL
T1N	0.02	0.016	0.021	0.013
T2N	0.02	0.018	0.020	0.018
T3N	0.05	0.028	0.029	0.052
T4N	0.02	0.018	0.019	0.015
T5N	0.04	0.030	0.027	0.029
T6N	0.02	0.014	0.011	0.016
T7N	0.03	0.025	0.028	0.020
T8N	0.03	0.021	0.020	0.021

T3N should be interpreted with caution as a large shudder was reported by the operator as the last wagon of the train passed the monitoring location. The reported vibration exposure for this event is likely to be more representative of a worst case impact associated with a damaged wagon than a typical exposure level.

The monitoring results presented above indicate the range of existing vibration impacts does not differ significantly for laden and unladen rail pass-by events. Background vibration levels were well below that of rail pass-by events and could not be attributed to any obvious industrial or transportation source.

9.3 ASSESSMENT OF POTENTIAL IMPACTS

An assessment of potential impacts was undertaken for noise and vibration during the construction and operational phases of the Project.

9.3.1 CONSTRUCTION NOISE IMPACTS

The management noise levels associated with construction for each of the sensitive receivers is presented in the following tables.

These are the limits with which construction noise impacts could have to comply.

Table 24 Construction Noise Management Levels – Residential Receivers

RECEIVING ENVIRONMENT	RECEIVER	MANAGEMENT LEVEL, L _{AEQ} , 15 MINUTE		CONSTRUCTION NOISE CRITERIA, DB(A)	
		STD HOURS	NON STD HOURS	STD HOURS	NON STD HOURS
Greta	R1	RBL +10	RBL +5	50	37
Mansfield Street	R2			45	37
Illalong	R2(a)			42	36
Tuckers Lane	R3			44	35
North Rothbury	R4			49	37
Branxton	R5			53	38
New England Highway	R6				
New England Highway, Greta	R6(a)				

Table 25 Construction Noise Management Levels – Non-residential Receivers

RECEIVING ENVIRONMENT	CONSTRUCTION NOISE CRITERIA, DB(A)	
	STD HOURS	NON STD HOURS
Greta Public School	60 (external) ¹	n/a ²
Greta Community Pre-School	60 (external)	n/a ²
Greta Arts and Sports Community Hall	60 (external)	60 (external)
Commercial Receivers	70 (external)	70 (external)

1 – The NSW Interim Construction Noise Guideline advises that as a guide, the difference between the internal noise level and the external noise level is typically 10dB with windows open for adequate ventilation. An external indicator of 60 dB (internal amenity level + 10dB) is therefore applied to this receiver as a means of assessing noise impacts.

2 – Construction noise criteria do not apply as these receivers are not considered to be in use during non-standard work hours.

Construction noise impacts were modelled based on two work phases; major earthworks (Phase 1) followed by establishment of site infrastructure (Phase 2).

The model assumes that major earthworks are finalised prior to commencing works on site infrastructure.

The following construction sources were modelled for the purposes of assessing impacts:-

1. Works around the provisioning shed and departure road.
2. Works around the central part of the site, including administration centre, maintenance shed and tank farm.
3. Works around the arrival road.
4. Works to construct the internal roadway and site entrance.

An inventory of the acoustically significant equipment to be utilised during construction works is provided in below.

Table 26 Inventory of Construction Equipment and Typical SWL

CONSTRUCTION EQUIPMENT	TYPICAL OPERATING SPL ¹ , DB(A)
Phase 1: Major Earthworks	
Tracked Excavator	77
Wheeled Backhoe Loader	67
Bulldozer	80
Road Scraper	87 ²
Dump Truck	81
Water Cart	81
Rock Breaker or Excavator	81 ²
Crushing Plant	90
Roller	79
Semi-trailer	80
Phase 2: Rail Sidings and Site Infrastructure	
Mobile Telescopic Crane	67
Concrete Truck and Pump	75
Concrete Truck	80
Wheeled Backhoe Loader	67
Semi trailer	80
Asphalt Pavement	77
Track Laying Equipment	80 ³

Note: 1. Typical SPL measured at 10m from the source, DEFRA (2005).

Note: 2. +5dB(A) modifying factor applied for potentially tonal or impulsive noise character

Note: 3. +10dB(A) modifying factor applied for potentially tonal and impulsive noise character

The predicted cumulative LAeq, 15 minute construction noise levels at the nearest sensitive receivers is shown in **Table 27**. **Figure 21**, **Figure 22** and **Figure 23** show the predicted noise level contours for each of the scenarios outlined in Table 27. Construction noise impacts were modelled only for neutral conditions as no significant scenarios were identified during assessment of daytime meteorological data in Section 4 in Appendix C. Analysis of impacts under adverse night time and winter conditions is also presented for the purposes of assessing potential worst case impacts where 24 hour operations are required. Results in bold text indicate a predicted impact greater than the PSNL for that receiving environment. These results include a +5dB(A) modifying factor.

Care should be taken in interpreting the impact predictions as they represent the worst case LAeq, 15 minute noise impact, and are likely to over-estimate the LAeq, period contribution from site operations.

Table 27 Predicted _{LAeq,15minute} Construction Noise Level, db(A)

DESCRIPTION	R1	R2	R2(a)	R3	R4	R5	R6	R6(a)
Neutral Conditions – Phase 1	50	74	52	43	33	30	52	48
Neutral Conditions – Phase 2	40	63	42	33	30	<30	49	44
Adverse Winter Night – Phase 2	39	49	42	31	32	32	44	36
Ambient L _{Aeq(day)} Noise Level	53	56		56	50	53	55	
Construction Noise Criteria								
Standard Hours (0700-1800)	50	45	42		44	49	53	
Non Standard Hours (1800-0700)	37	37	36		35	37	38	

The results show the following indicate that noise impact will comply with the construction noise criteria for all receivers in the following receiving environment under all meteorological conditions at all stages of the construction program:-

- North Rothbury Receiving Environment.
- Branxton Receiving Environment.

The results show the predicted construction noise impacts may exceed the criteria for sensitive receivers in the following locations:-

- Greta Receiving Environment – Phase 2 works would likely comply, however, Phase 1 works under neutral conditions, and Phase 2 works under adverse winter night time conditions, are likely to exceed the criteria with construction noise impacts up to 53dB(A) and 45dB(A) respectively under worst case conditions. It is important to note that while predicted impacts do exceed the construction noise criteria, they remain below the amenity criteria noise levels for the receiving environment 60dB(A) (daytime) and 45dB(A) (night).

Further, given the temporary nature of construction noise impacts and the potential for masking by existing transportation noise sources, the impact may be effectively managed by on-site work practices.

- Illalong Receiving Environment – Phase 1 works present the most significant construction noise impact, with noise levels expected to approach the Highly Noise Affected management level of 75dB(A) at receivers adjacent to the site entry during construction of the site access road and noise barrier. $L_{Aeq,15\text{minute}}$ noise levels during this stage of Phase 1 works may reach 74dB(A) at receivers closest to construction works, however, it should be noted that the duration of these construction works will be significantly shorter than for major earthworks on the remainder of the site. Phase 2 works would likely comply receivers to the south-east of the site in Illalong but may exceed the criteria by up to 5dB(A) at receivers on Mansfield Street during standard work hours. Phase 2 works are likely to exceed the criteria under adverse winter night-time conditions with impacts up to 49dB(A) under these operational and meteorological conditions at receivers on Mansfield Street and 42dB(A) at receivers in Illalong.
- Tuckers Lane Receiving Environment - The results presented in Section 7.4 of Appendix C indicate that noise impact may exceed the construction noise criteria by 1 dB(A) at receivers in the Tuckers Lane receiving environment during Phase 1 earthworks. Predicted noise impacts are expected to comply at these receivers during the construction Phase 2 scenario.

- New England Highway Receiving Environment - The results indicate that predicted construction noise impacts may exceed the criteria for sensitive receivers to the north of the development along the New England Highway under adverse winter night time conditions, where 24 hour construction works may be required.

Construction noise levels are likely to exceed the criteria for most receivers adjacent to the New England Highway, with a maximum impact of 44dB(A) expected.

While above the criteria for non-standard work hours, this impact is lower than the 45dB(A) amenity criteria for this receiving environment, and well below the ambient LAeq, night noise level associated with the passage of vehicle on the New England Highway. Modelling results indicate impacts generated by construction works undertaken during standard work hours may result in only minor exceedence of the construction noise criteria at a small number of receivers to the south of the New England Highway.

The results show that Noise generated during the construction phase of the development is likely to exceed the construction noise criteria in the Greta, Illalong and New England Highway receiving environments. Management of potential impacts should be undertaken by development of a Construction Noise Management Plan as part of detailed construction planning. This has been reflected in the mitigation measures for the Project.

Review of impact predictions indicates construction noise impacts are likely to be below the construction noise management level for all non-residential receivers identified.

Table 34 in Appendix C quantifies the impacts above the construction noise management level. The results indicate that during the earthworks phase of construction, approximately 320 receivers may experience some audible impacts. This is expected to last approximately three months and will be transient as earthworks move along the site. During construction of the buildings and site facilities, approximately 20 receivers may experience audible impacts.

Figure 21 Predicted Phase 1 Construction Noise Impact, Neutral Conditions

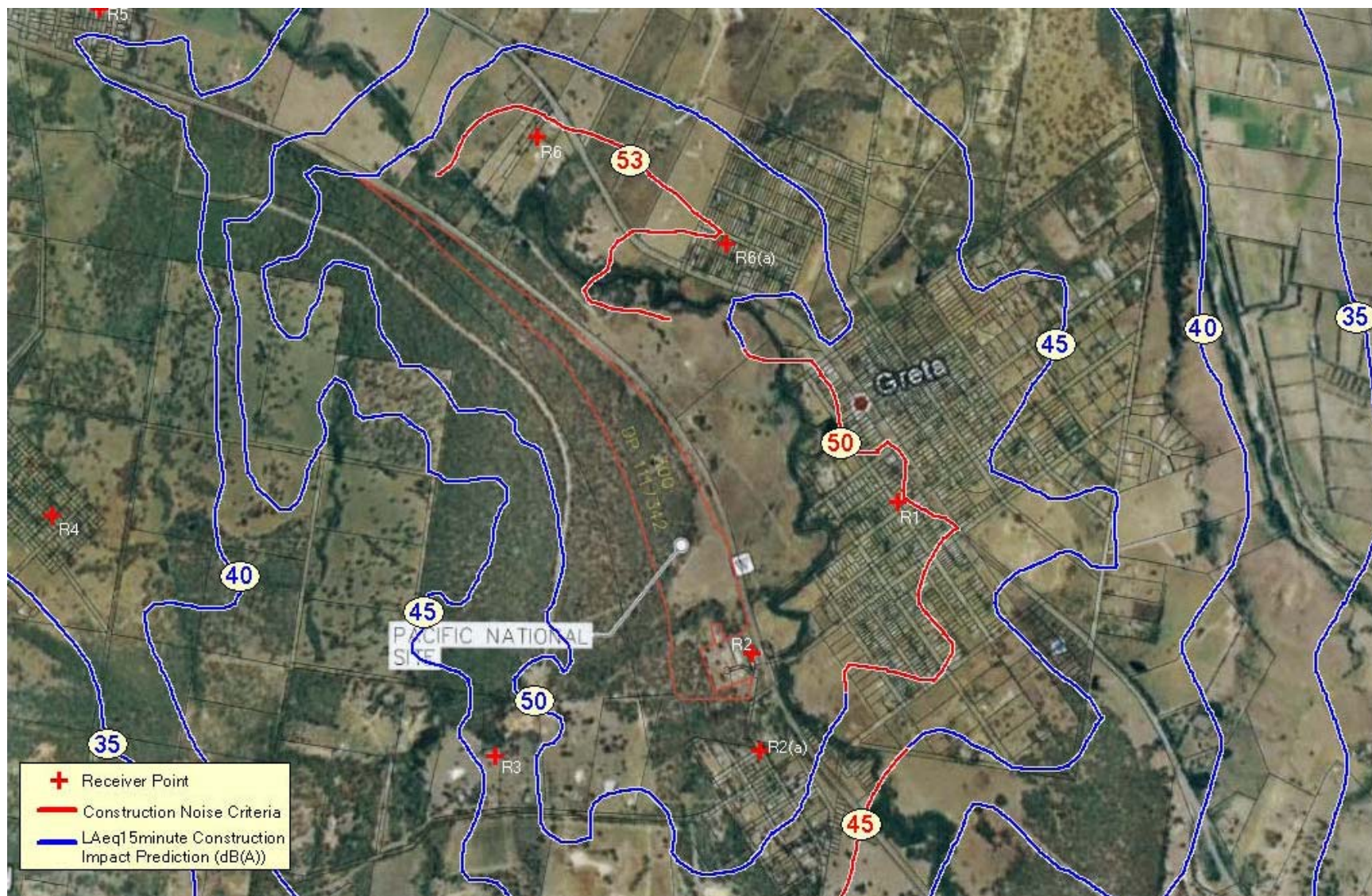


Figure 22 Predicted Phase 2 Construction Noise Impact, Neutral Conditions

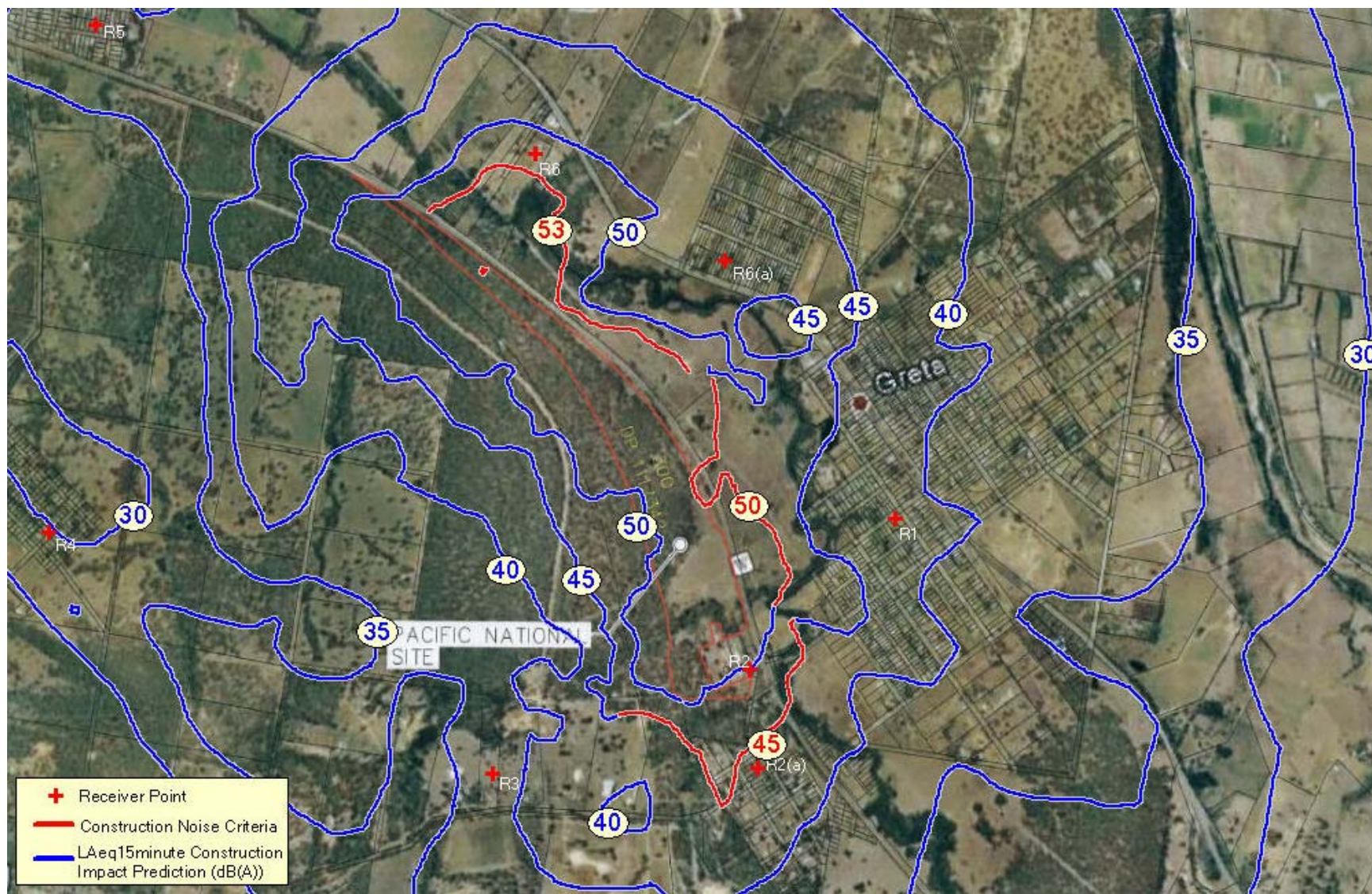
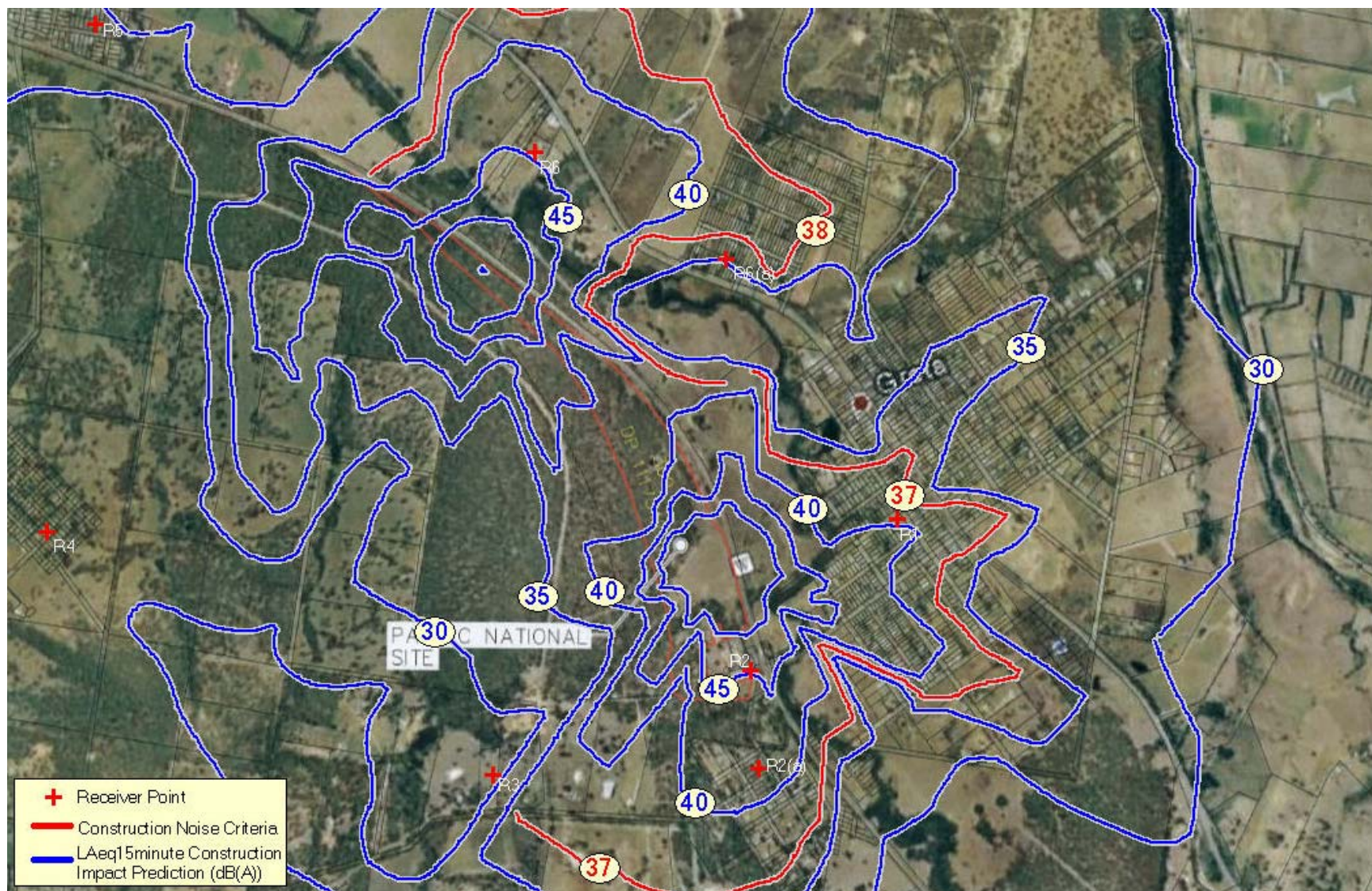


Figure 23 Predicted Phase 2 Construction Noise Impact, Adverse Winter Night Conditions



9.3.2 OPERATIONAL NOISE MODELLING METHODOLOGY

Prediction of the cumulative $L_{Aeq,15\text{minute}}$ noise level resulting from the proposed development was undertaken by modelling noise sources using the Environmental Noise Model (ENM) software. ENM calculates the noise level at specified receiver locations (Single Point Calculation) and generates noise level contours over a defined area (Contour Calculation).

It is important to note that while the impact predictions are made on the basis of the $L_{Aeq,15\text{minute}}$ criteria, this level of activity is unlikely to occur simultaneously in any given 15 minute period. On this basis the model predictions will likely over-estimate the impacts associated with the development as emissions from these sources will rarely occur at the same time. Furthermore, level of site activity will vary throughout the day, resulting in extended periods of reduced noise emissions from the operation.

The predicted cumulative $L_{Aeq,15\text{minute}}$ noise levels are then compared against the project-specific noise levels. If the project-specific noise levels are exceeded, feasible and reasonable noise mitigation strategies will need to be assessed for the proposed development, to ensure compatibility with the existing noise environment. If the proposed development can achieve the project-specific noise levels during the night time period it will also achieve the less stringent day and evening criteria.

9.3.3 OPERATIONAL NOISE SOURCES

The potential noise and vibration impacts that may be generated by the proposed development include:-

- Temporary noise and vibration impacts associated with construction of the facility.
- Ongoing noise and vibration impacts associated with the operation of the Train Support Facility.

It is important to note that the Train Support Facility would not generate additional rail movements on the Main Northern Railway line, rather would service the existing traffic that currently passes through Greta, and allow this traffic to be diverted for re-fuelling or planned light maintenance.

An analysis of potential noise impacts associated with the operation of the Project was undertaken based on measurement data from existing Pacific National facilities that are representative of proposed operations at Greta. The following table details representative source noise levels for the Project:

Table 28 Representative source noise levels (Source: Advitech, 2010)

DESCRIPTION	SWL, DB(LIN)
Idling locomotive (per unit)	112
Locomotive and wagon set (pass-by)	108
Shunting empty wagons	105
Idling semi-trailer	106
Vehicles on internal roadway	110
Maintenance shed operations	99
Wheel lathe operations	109
Wash-bay operations	100

The model presents a worst case noise impact for Stage 3 operations, comprising:

- an idling locomotive set (3 x locomotives) in the provisioning shed on tracks 1 to 3;
- an idling locomotive set to the south of the provisioning shed on tracks 4 and 5;
- one train entering the site via the arrival road and internal track No.1;
- one train leaving the site via internal track No. 2 and the departure road;
- operations within maintenance shed, wash bay and wheel lathe buildings;
- shunting operations on the wagon siding;
- vehicle movements (light and heavy vehicles) on internal roadways; and
- idling semi-trailer pumping fuel to storage tanks.

A full list of assumptions of the model can be found in Section 5.3 of Appendix C.

9.3.4 **OPERATIONAL NOISE MODELLING RESULTS**

Preliminary modelling results indicated traffic noise impacts associated with the site access road were likely to significantly exceed the PSNL in the receiving environment to the south-west of the site. While the impact is likely to be restricted to peak periods, the extent and frequency of the impact was considered significant to the community, particularly during the early morning shoulder period.

An investigation into the efficacy of potential mitigation operations was undertaken as a means of assessing ways in which this impact may be managed at the planning stage of the development. The results of this investigation indicate that impacts from internal road noise may be ameliorated by:-

- Constructing a barrier to the east of the internal roadway to mitigate emissions from vehicles accessing the site. In concept, the barrier would be approximately 3 metres high and 500 metres long; and
- Implementing operational controls to restrict heavy vehicle movements during the night period.

These are reflected in the mitigation measures proposed for the Project in Section 9.4 and in the Draft SOC's in Section 18.

The modeling results presented in the following table and figures assume these controls are implemented to manage noise impacts associated with the site access road. Exceedences are highlighted in bold.

Table 29 Predicted $L_{Aeq, 15 \text{ minute}}$ noise level, dBA (Source: Advitech, 2010)

DESCRIPTION		R1	R2	R2(A)	R3	R4	R5	R6	R6(A)
Neutral Conditions		32	40	34	<30	<30	<30	34	34
Adverse Spring / Summer /Autumn		32	39	30	<30	<30	<30	40	42
Adverse Winter		36	42	38	32	<30	<30	38	39
PSNL	Day (0700-1800)	45	40		37	39	44	48	

DESCRIPTION		R1	R2	R2(A)	R3	R4	R5	R6	R6(A)
	Evening (1800-2200)	44		40	37	39	44		48
	Night (2200-0700)	37		37	37	35	37		38

It should be noted that additional receiver points were modelled for receivers located:-

- in the hamlet of Illalong (R2(a)); and
- on the New England Highway at Greta (R6(a)).

The PSNL for these locations was assumed the same as at background monitoring locations for these receiving environments. Table 25 in Appendix C quantifies the impacts above the PSNL for Stage 3 of operations. The results indicate that during adverse conditions approximately 290 receivers may experience noise impacts above the PSNL. This analysis should be interpreted in the context of monitoring and modelling results present in Section 3.2 of Appendix C that indicate that ambient L_{Aeq} noise levels associated with existing transportation sources already exceeded impact predictions by up to 10dB(A) in these receiving environments. Further, cumulative noise assessment shows that in the context of the proposed Hunter Expressway and the construction of the third track on the Main Northern Railway, the contribution from the Project is not significant in comparison to existing levels of transportation noise, and will have negligible influence on cumulative L_{Aeq} , period noise levels.

The following figures detail the modelled impact predictions of the Project for the L_{Aeq} , 15 minute impact.

Figure 24 Predicted $L_{Aeq, 15\text{minute}}$ noise level in neutral conditions (Source: Advitech, 2010)

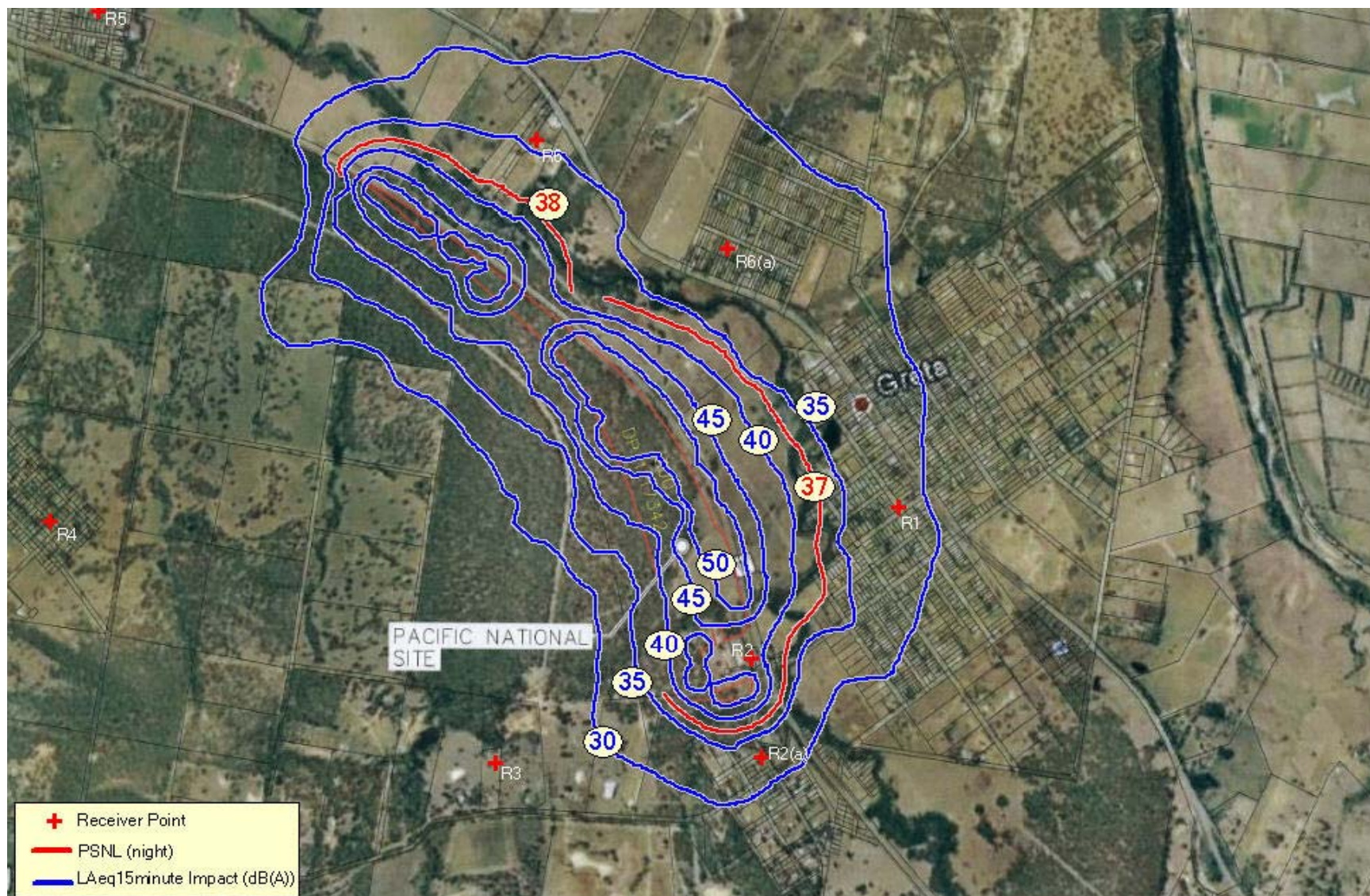


Figure 25 Predicted $L_{Aeq, 15\text{minute}}$ noise level in adverse SSW winds (Source: Advitech, 2010)

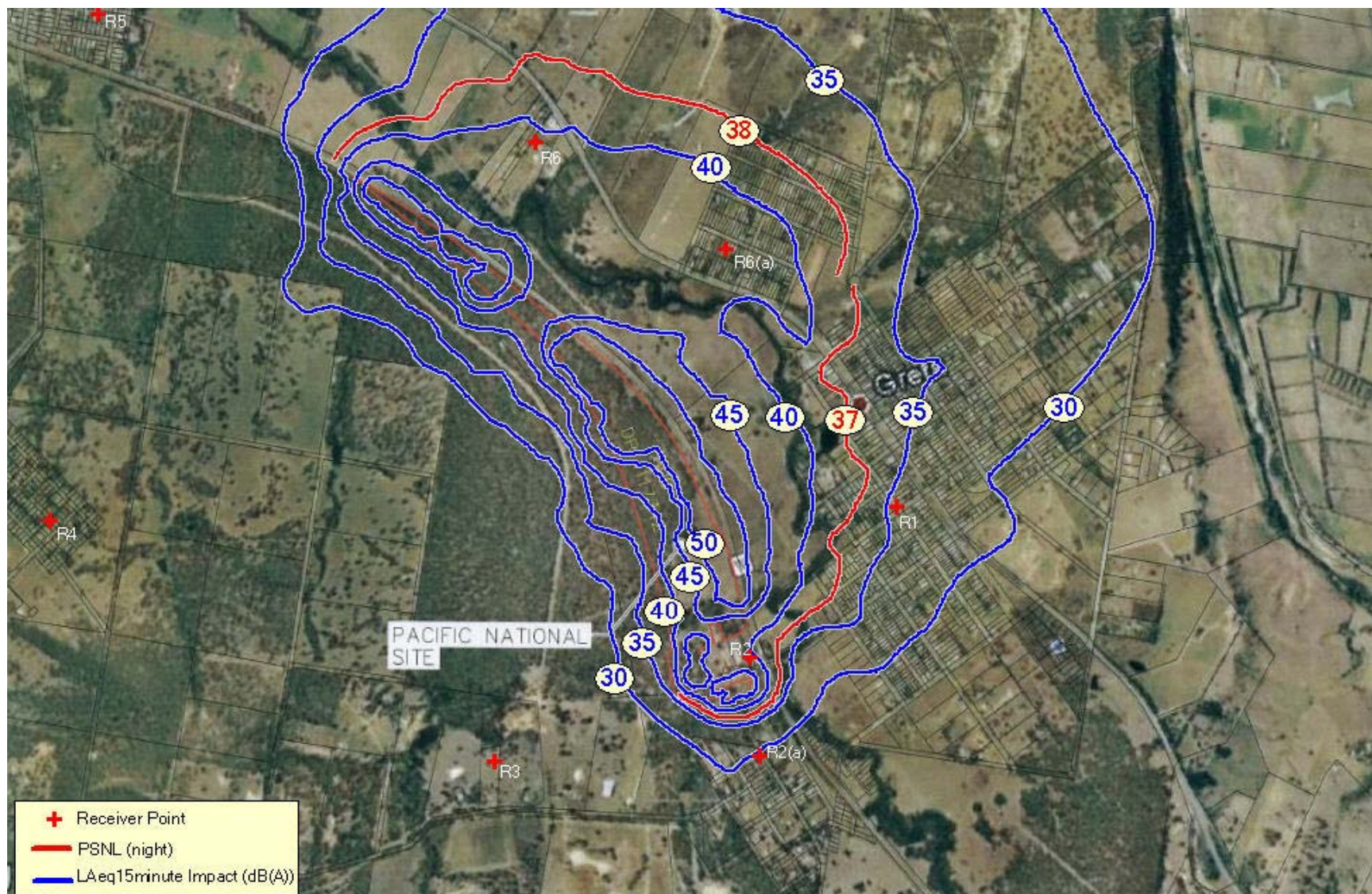
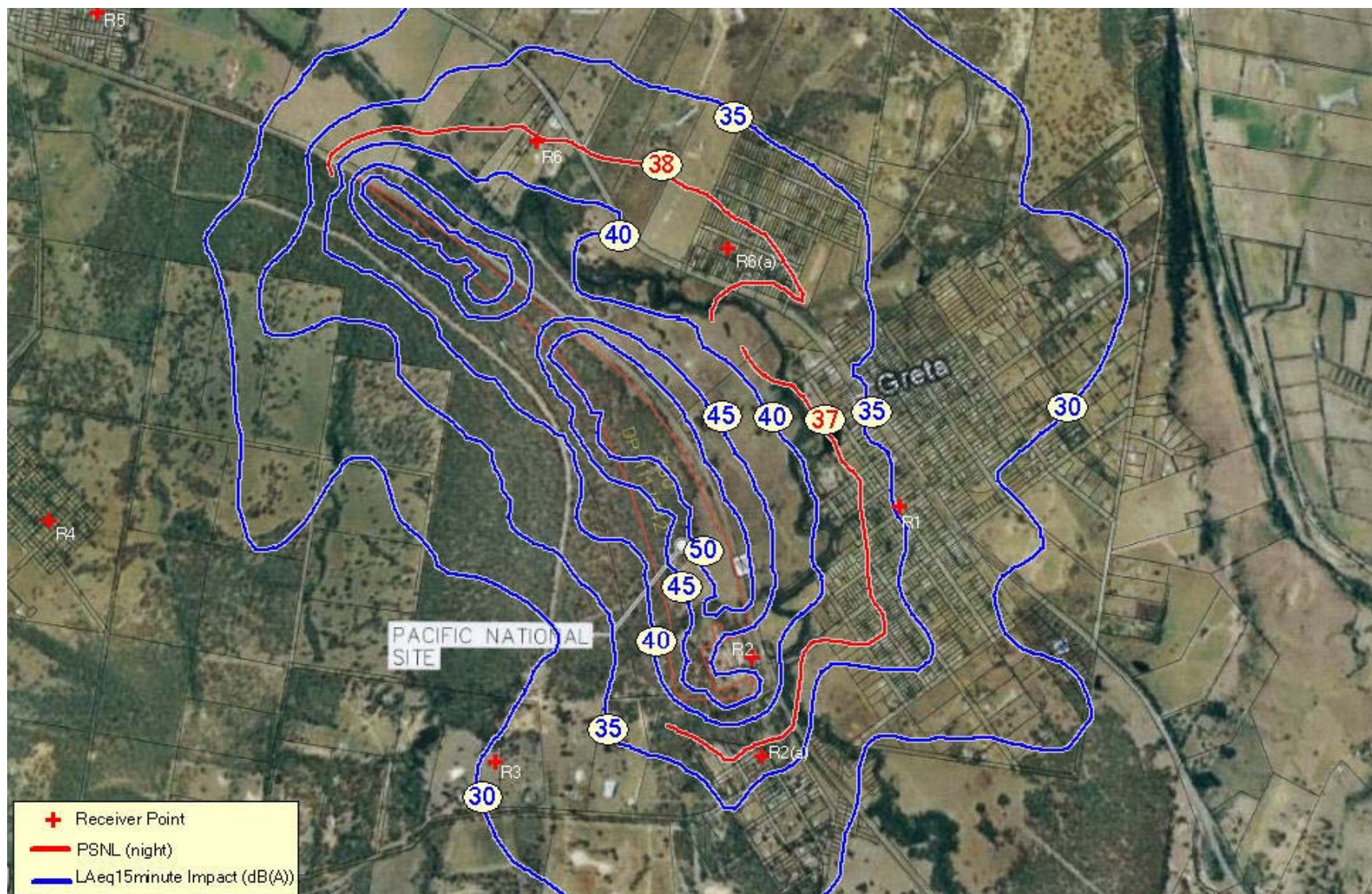


Figure 26 Predicted $L_{Aeq, 15\text{minute}}$ noise level in adverse winter conditions (Source: Advitech, 2010)



9.3.5 **INTERPRETATION OF OPERATIONAL MODELLED IMPACT PREDICTIONS**

An assessment of potential noise impacts indicates the following impacts would be experienced in the receiving environments:-

Greta Receiving Environment (R1)

The results presented in Table 29 indicate noise generated by the proposed TSF will comply with the amenity criteria for the Greta receiving environment under all operational and meteorological conditions. Review of model outputs indicates dominant impacts on the Greta receiving environment are likely to be from trains entering the facility and moving along internal tracks 1 and 2. Impact predictions from the model indicate:

- Under neutral conditions, Stage 3 operations are expected to comply with the day, evening and night PSNL;
- During periods of south and south-west winds LAeq, 15 minute noise levels would likely exceed the night period criteria for the approximately half the receivers west of Nelson Street, including some to the north of the New England Highway. Receivers on Wyndham and Sale Streets (closest to the development) may experience LAeq, 15 minute noise levels up to 39dB(A) under these meteorological conditions; and
- During periods of temperature inversion LAeq, 15 minute noise levels would likely exceed the night period criteria at most receivers south of the New England Highway and approximately half of the receivers to the east of Nelson Street. Receivers on Wyndham and Sale Streets may experience LAeq, 15 minute noise levels up to 40dB(A).

While the assessment indicates the PSNL may be exceeded during Stage 3 operations, these results should be interpreted in the context of the ambient noise environment. Assessment of background monitoring data presented in Section 3.2 indicates that ambient LAeq, period noise levels from existing transportation sources is on the order of 50 dB(A) during the night period, 10 dB(A) greater than the expected worst case LAeq, 15 minute noise impact. The facility is unlikely to make any measureable contribution under typical noise levels observed in this receiving environment.

The facility may be audible at times where the impact exceeds the criteria, however the character of noise generated by the development is expected to be similar to emissions from existing rail and road transportation sources.

Illalong Receiving Environment (R2)

Review of model outputs indicates road traffic accessing the site via the Mansfield Street entrance presents the dominant noise impact from the Project operations for receivers in the village of Illalong.

Trains entering the site via the arrival road were found to potentially contribute to noise impacts at receivers adjacent to the site access on Mansfield Street, although road noise remains the dominant impact at this location. Consequently, the character of the noise impact in this receiving environment is not considered to change significantly from that currently experienced. Impact predictions from the model indicate:

- Under neutral conditions exceedence of the $L_{Aeq,15minute}$ criterion is restricted to receivers adjacent to the site access on Mansfield Street. $L_{Aeq,15minute}$ noise levels at receivers on Mansfield Street adjacent to the site access road may experience noise levels up to 40dB(A) during periods of peak internal vehicle movement.
- During periods of south and south-west winds the $L_{Aeq,15minute}$ noise impact would likely comply with the night period PSNL for all receivers in Illalong. $L_{Aeq,15minute}$ noise levels at receivers on Mansfield Street adjacent to the site access road may experience noise levels up to 39dB(A) attributable to the passage of vehicles on the internal access road; and during periods of temperature inversion there would likely be a minor exceedence of the $L_{Aeq,15minute}$ noise criteria for receivers on the northern fringe of Illalong. $L_{Aeq,15minute}$ noise levels at receivers on Mansfield Street adjacent to the site access road may experience noise levels up to 42dB(A).

While the assessment indicates the PSNL may be exceeded during Stage 3 operations, these results require interpretation in the context of the ambient noise environment. Assessment of background monitoring data presented in Section 3.2 indicates that ambient $L_{Aeq,period}$ noise levels from existing transportation sources is on the order of 57dB(A) during the night period, 15dB(A) greater than the expected worst case $L_{Aeq,15minute}$ noise impact from the proposed TSF.

Review of data presented in Appendix I indicates the minimum $L_{Aeq,15\text{minute}}$ noise level measured during background monitoring was 45 dB(A), with 99% of results exceeding 47 dB(A). Hence, it is considered that any contribution from TSF operations will be masked by existing transportation sources.

Tuckers Lane Receiving Environment (R3)

The results presented in Section 5.4 of Appendix C and discussed throughout this Section, indicate that noise impact will comply with the PSNL criteria for all receivers in the Tuckers Lane receiving environment under all significant meteorological conditions. The model indicates the proposed development will comply with the day, evening and night time criteria for Stage 3 operations.

North Rothbury Receiving Environment (R4)

The results presented indicate that noise impact will comply with the PSNL criteria for all receivers in the North Rothbury receiving environment under all significant meteorological conditions. The model indicates the proposed development will comply with the day, evening and night time criteria for Stage 3 operations.

Branxton Receiving Environment (R5)

The results presented in Section 5.4 of Appendix C and discussed throughout this Section of this report indicate that noise impact will comply with the PSNL criteria for all receivers in the Branxton receiving environment under all significant meteorological conditions. The model indicates the proposed development will comply with the day, evening and night time criteria for Stage 3 operations.

New England Highway Receiving Environment (R6)

Modelling results presented in Table 18 indicate noise impacts associated with the TSF will comply with the amenity criteria for the New England Highway receiving environment. Review of model outputs indicates idling locomotives at the provisioning shed and movement of trains on internal roads 1 and 2 present the dominant contribution from the TSF operations for receivers along the New England Highway to the north of the proposed development. Impact predictions from the model indicate:-

- Under neutral conditions, Stage 3 operations are expected to comply with the day, evening and night PSNL;

- During periods of south and south-west winds $L_{Aeq,15minute}$ noise levels would likely exceed the night period criteria at receivers on the New England Highway between Greta and Branxton. Receivers south of the New England Highway (closest to the development) may experience $L_{Aeq,15minute}$ noise levels up to 42dB(A) under these meteorological conditions.
- The model results that operations under this meteorological scenario would comply with the PSNL for the evening period; and
- During periods of temperature inversion $L_{Aeq,15minute}$ noise impact would likely exceed the night period criteria at receivers on the New England Highway with noise levels under this meteorological scenario approaching 40dB(A).

While the assessment indicates the PSNL may be exceeded during Stage 3 operations, these results should be interpreted in the context of the ambient noise environment. Assessment of background monitoring data presented in Section 3.2 indicates that ambient $L_{Aeq,period}$ noise levels from existing transportation sources is on the order of 53dB(A) during the night period, 11dB(A) greater than the expected worst case $L_{Aeq,15minute}$ noise impact. The facility is unlikely to make any measureable contribution under typical noise levels observed in this receiving environment. The facility may be audible at times where the impact exceeds the criteria, however the character of noise generated by the development is expected to be similar to emissions from existing rail and road transportation sources.

Assessment of Impacts at Non-Residential Receivers

Review of impact predictions presented above indicates Stage 3 operations impacts are likely to be well below the PSNL for all non-residential receivers identified.

Summary of Impact on Receiving Environments

An assessment of potential noise impacts indicates the following receiving environments would experience negligible impact:-

- Tuckers Lane (south of the Project).
- North Rothbury (west of the Project).
- Branxton (north-west of the Project).

The large separation distances between site operations and these receiving environments, as well as intervening topography mean that the Project is likely to be inaudible at these locations, except at certain meteorological conditions. In instances where operations may be audible the impact would be below the PSNL at these locations.

Noise modelling for the $L_{Aeq, 15 \text{ minute}}$ impact shows that noise impacts would comply with the amenity criteria in all receiving environments adjacent to the Project. Potential noise impacts above the intrusiveness criteria were observed in the following receiving environments:-

- Greta (north-east of the Project).
- Illalong (south-west of the Project).
- Receivers on the New England Highway (north of the Project).

Modelling results indicate worst case noise impacts in these receiving environments would comply with the day and evening PSNL under all significant meteorological conditions. Exceedence of the night period PSNL may occur for:-

- Receivers in Greta may experience noise levels up to 40dB(A) during periods of south-westerly winds and temperature inversion.
- Receivers in Illalong may experience noise levels up to 42dB(A) under neutral conditions and during periods of temperature inversion.
- Receivers north of the site on the New England Highway may experience noise levels up to 42dB(A) during periods of south-westerly winds.

The following figures detail the modelled impact predictions of the Project for the $L_{Aeq, 15 \text{ minute}}$ impact.

Figure 27 Predicted $L_{Aeq, 15\text{minute}}$ noise level in neutral conditions (Source: Advitech, 2010)

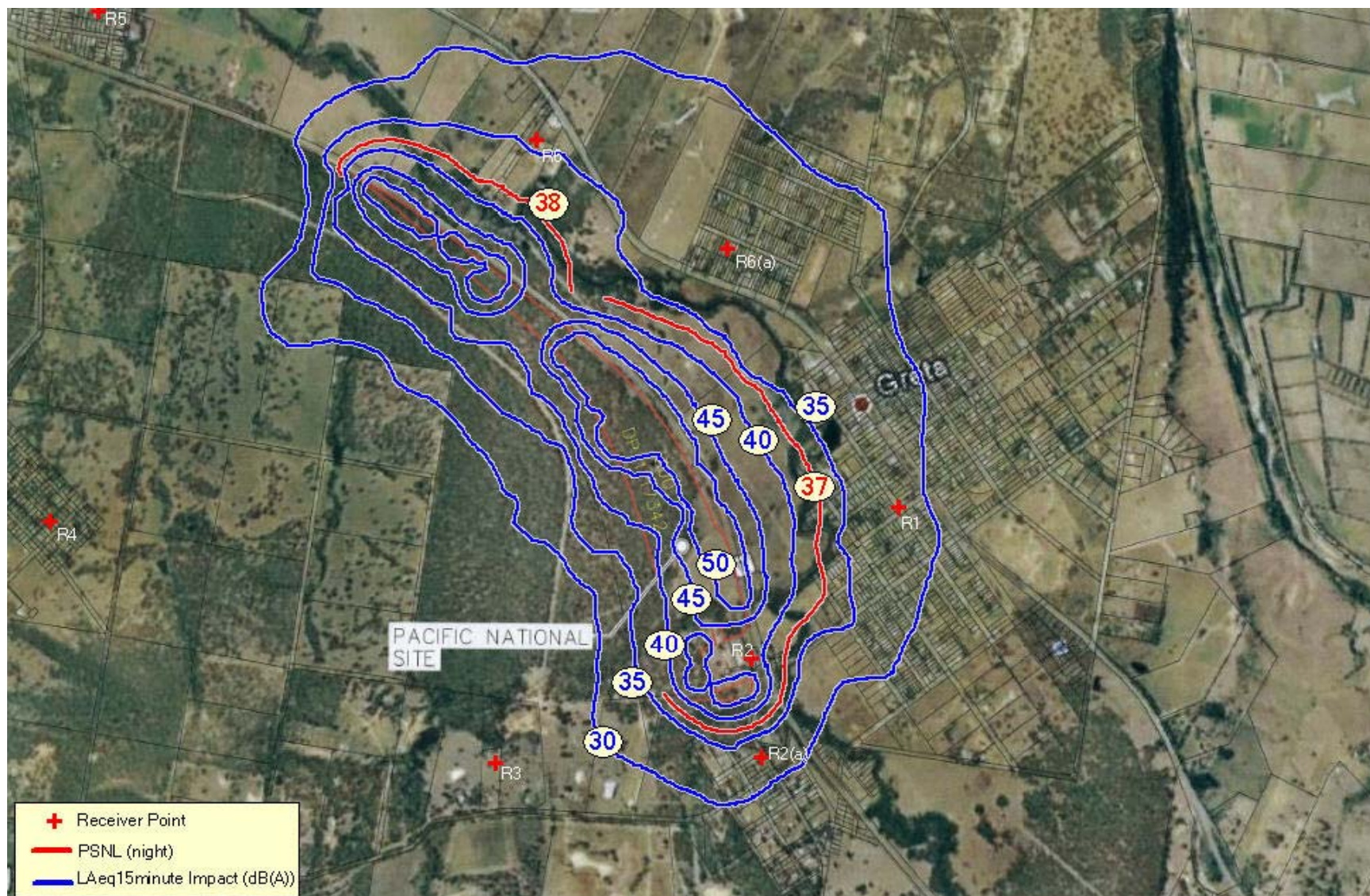


Figure 28 Predicted $L_{Aeq, 15\text{minute}}$ noise level in adverse SSW winds (Source: Advitech, 2010)

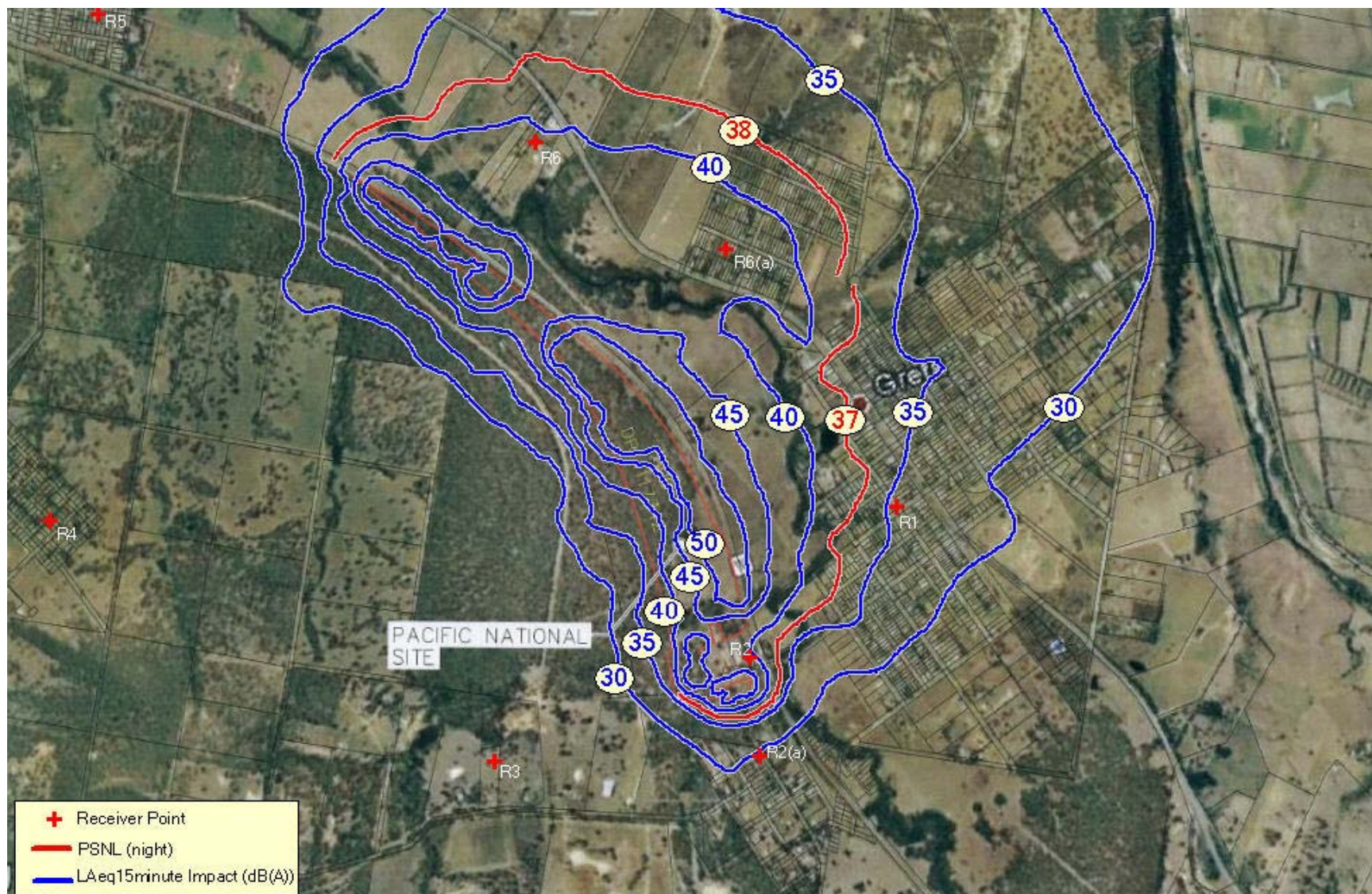
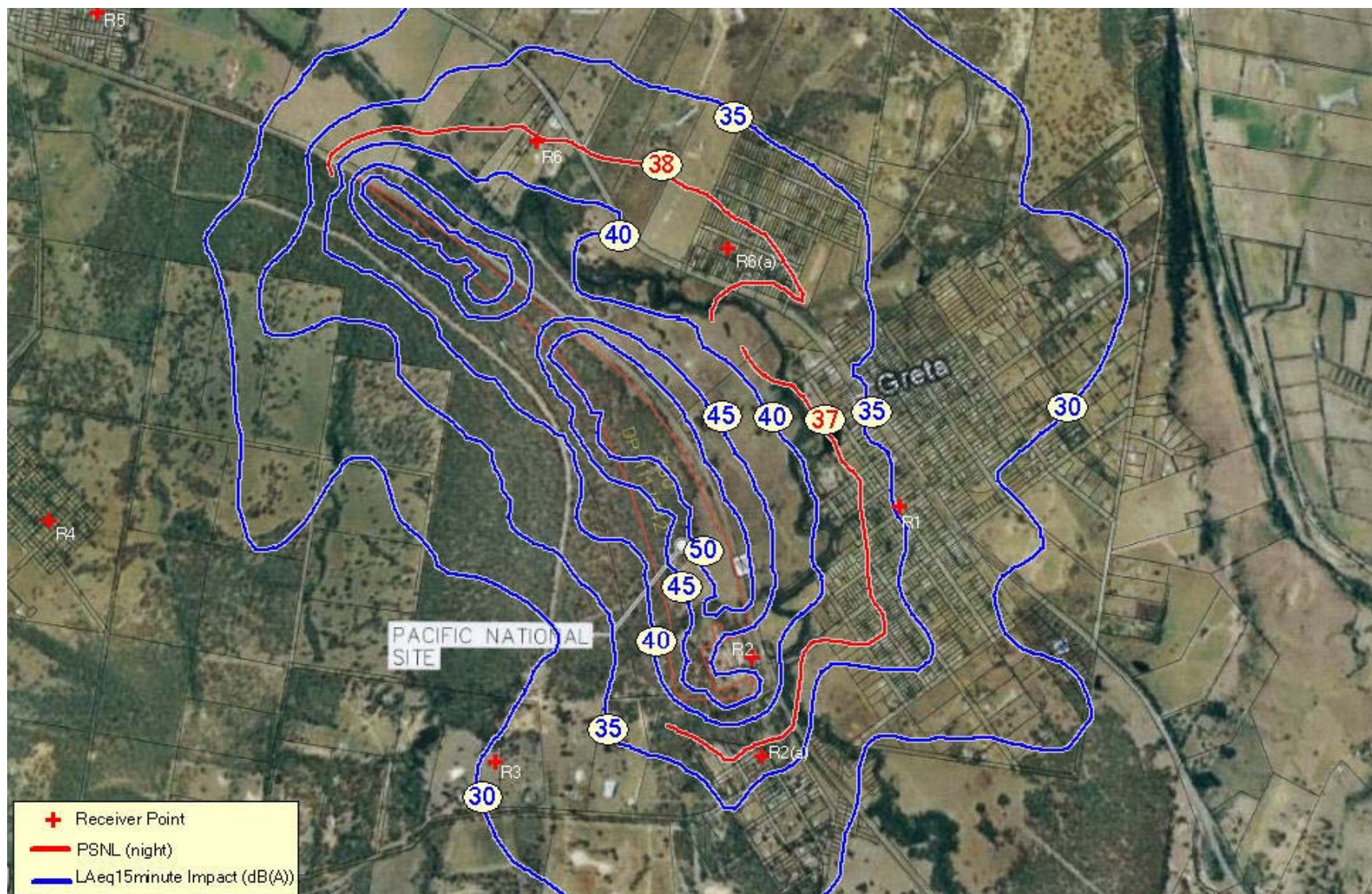


Figure 29 Predicted $L_{Aeq, 15\text{minute}}$ noise level in adverse winter conditions (Source: Advitech, 2010)



9.3.6 **SLEEP DISTURBANCE**

The Noise Guide for Local Government suggests that to avoid sleep disturbance, the L_{A1} noise level associated with the source (that is the noise level which is exceeded for one per cent of the time) should not exceed the background noise level by more than 15dB.

Using the Rating Background Level (RBL) as a guide, the corresponding maximum noise level to avoid sleep disturbance at adjacent residential receivers during the night period is presented.

Table 30 Sleep Disturbance Criteria

RECEIVING ENVIRONMENT	RBL (NIGHT) DB(A)	SLEEP DISTURBANCE CRITERIA, DB(A)
Greta	32	47
Illalong	32	47
Tuckers Lane	36	51
North Rothbury	30	45
Branxton	32	47
New England Highway	33	48

Transient Noise

Transient noise sources contributing to L_{A1} noise levels generated by the proposed facility are likely to be generated by bunching and stretching of wagons when trains are stopping or starting. Some impacts would also be experienced where shunting is proposed, although it is noted that the Project has been designed to minimise the need for shunting. The passage of vehicles on the internal roadways at night will also generate transient noise events. An assessment of transient noise was undertaken and the results presented in detail in Section 6.2 of Appendix C.

The predicted noise level that would contribute to sleep disturbance from transient rail noise was modelled based on the difference between measured L_{Aeq} and L_{A1} noise levels from unattended monitoring data from the Hunter Bulk Terminal (HBT) operations at Kooragang Island.

A summary of the monitoring results are presented in **Table 31**. Analysis of monitoring data indicates that on average L_{A1} noise levels exceed L_{Aeq} noise levels by approximately 7dB(A).

Table 31 Sleep Disturbance Criteria – Transient Rail Noise

PERCENTILE	$L_{A1} - L_{Aeq}$ DIFFERENTIAL
50 th Percentile	7 dB(A)
95 th Percentile	12 dB(A)

The Interim Guideline for the Assessment of Noise from Rail Infrastructure Projects (DECC 2007) suggests that transient noise generated by rail traffic be assessed in terms of the 50th and 95th percentile L_{Amax} noise level. This represents a more conservative approach than provided by the INP, which typically considers the distribution of potential impacts by requiring assessment of 90th percentile noise levels.

It should also be noted the stabling yard and provisioning facilities at the HBT Kooragang Island site are subject to very little topographic relief which would enhance the prevalence of bunching and stretching of wagons as trains stop and start. Information available at the time of the assessment indicates the track cross sections of the proposed TSF at Greta are subject to more significant relief, meaning wagons are more likely to remain compressed or under tension, leading to a reduction in bunching or stretching on departure. It is therefore considered the distribution of measured difference between L_{Aeq} and L_{A1} impacts presented in Figure 11 of Appendix C provides a conservative assessment of L_{A1} noise levels likely to be experienced at Greta.

Assessment of sleep disturbance impacts generated by transient noise sources is assessed in terms of an L_{A1} noise level equal to the $L_{Aeq,15}$ minute impact plus 12dB(A). This provides an assessment of potentially sleep disturbing noise impacts from 95% of transient noise events.

Noise generated by vehicles on the internal roadway will have potential to create sleep disturbance impacts at receivers adjacent to the site entry. The noise level that would contribute to sleep disturbance from this source is based on the results of operator attended monitoring at receivers on Mansfield Street.

Analysis of monitoring data indicates that the L_{A1} noise level for pass by events on Mansfield Street exceeds the L_{Aeq} level by up to 15dB(A). While it is acknowledged that vehicles entering the site are likely to be travelling at lower speeds than those observed in the monitoring data, application of the L_{Aeq} plus 15dB indicator as a means of assessing transient road noise impacts is considered a conservative assessment of potential sleep disturbance impacts.

Other transient noise sources contributing to L_{A1} noise levels from maintenance operations may include materials handling operations and reversing alarms from vehicles moving around the maintenance facilities. The predicted noise level that would contribute to sleep disturbance from these sources is modeled based on L_{A1} noise levels associated with materials handling operations observed during operator attended monitoring within a fabrication workshop from the Advitech noise source library. Materials handling L_{A1} levels are typically observed to be up to 10dB(A) greater than the equivalent L_{Aeq} noise level, however greater attenuation of L_{A1} noise levels would be expected due to the distribution of sound energy higher in the frequency spectrum.

Results

The predicted L_{A1} noise levels at the nearest sensitive receivers is shown in Table 21. A +12dB correction between L_{A1} and L_{Aeq} noise levels associated with proposed operations was applied in order to provide an assessment potential sleep disturbance impacts for 95% of transient noise events. The predicted L_{A1} noise level is therefore considered to represent the expected worst case impact.

Table 32 Predicted L_{A1} Noise Level, dB(A)

DESCRIPTION	R1	R2	R2(a)	R3	R4	R5	R6	R6(a)
<i>Predicted L_{Aeq}, 15 minute Noise Level</i>								
Neutral Conditions	32	40	34	<30	<30	<30	34	34
Adverse Spring / Summer / Autumn	32	39	30	<30	<30	<30	40	42
Adverse Winter	36	42	38	32	<30	<30	38	39
L_{A1} Correction Factor Rail Sources: +12 dB Road Sources: +15 dB Maintenance Operations Sources: +10 dB								
<i>Predicted L_{A1} noise level</i>								
Neutral Conditions	44	53	47	36	30	<30	46	46
Adverse Spring / Summer / Autumn	47	52	43	55	<30	32	53	54
Adverse Winter	48	55	60	32	40	35	50	52
Sleep Disturbance Level - Night (2200-0700)	47	47		51	45	47	48	

Greta Receiving Environment (R1)

The results indicate that impact will comply with the sleep disturbance criteria for the majority of receivers in Greta. Predicted L_{A1} noise levels indicate minor exceedences of the sleep disturbance criteria may occur:-

- Under neutral conditions exceedence of the L_{A1} criterion is restricted to a small number of receivers to the south-west of Sale Street. Exceedence of the criteria in these locations is expected to be on the order of 1 to 2 dB(A);
- Under SSW winds the L_{A1} noise impact would likely exceed the sleep disturbance criteria for the majority of receivers in Greta, including those north-east of the New England Highway. Receivers on Wyndham and Sale Streets closest to the industrial development may experience L_{A1} noise levels up to 50dB(A) under these meteorological conditions; and

- During periods of temperature inversion L_{A1} noise impact would likely exceed the sleep disturbance criteria for approximately half of the receivers in Greta, including some to northeast of the New England Highway. Receivers on Wyndham and Sale Streets closest to the proposed TSF may experience L_{A1} noise levels up to 50dB(A) under these meteorological conditions.

While the assessment indicates the sleep disturbance criteria may be exceeded during Stage 3 operations of the TSF, these results should be interpreted in the context of the ambient noise environment. Analysis of attended monitoring data presented in Appendix II in Appendix C indicates that ambient L_{A1} noise levels from existing transportation sources may reach levels up to 60 dB(A). While the TSF is considered an industrial noise source, the character of transient emissions from site operations is likely to be generally consistent with existing noise sources.

While L_{A1} emissions from the TSF may exceed the criteria with a maximum expected level of 49 dB(A), this impact is similar in character to, but significantly lower than existing L_{A1} noise levels experienced in the Greta receiving environment.

Illalong Receiving Environment (R2)

The results indicate that impact will comply with the sleep disturbance criteria for the majority of receivers in Illalong. Predicted L_{A1} noise levels indicate minor exceedences of the sleep disturbance criteria may occur:-

- Under neutral conditions the L_{A1} noise impact would comply with the sleep disturbance criteria for the all receivers in Illalong village. L_{A1} noise impacts may be up to 53dB(A) at receivers adjacent to the site access on Mansfield Street;
- Under SSW winds the L_{A1} noise impact would likely comply with the sleep disturbance criteria for the all receivers in Illalong village. L_{A1} noise impacts may be up to 52dB(A) at receivers adjacent to the site access on Mansfield Street; and
- During periods of temperature inversion L_{A1} noise impact would likely be on the order of 50dB(A) at receivers north of the Tuckers Lane intersection. L_{A1} noise levels at receivers on Mansfield Street adjacent to the site access road may experience noise levels up to 55dB(A).

These results assume restrictions on access to the site by heavy vehicles between the hours of 10:00pm and 7:00am. L_{A1} noise levels associated with heavy vehicles accessing the site are likely to be in the order of +5dB above impact predictions presented above. Detailed review of modelling outputs indicates the L_{A1} noise levels in the Illalong receiving environment are generated by vehicles accessing the site via the Mansfield Street entrance. Review of attended monitoring results presented in Appendix II of Appendix C indicates that ambient L_{A1} noise levels associated with the passage of vehicles on Mansfield Street and Camp Road may reach 56dB(A), while the passage of trains generates L_{A1} noise levels up to 70dB(A) at receivers on Mansfield Street.

While L_{A1} emissions from the TSF may exceed the criteria with a maximum expected level of 56dB(A), this impact is similar to L_{A1} noise levels currently experienced in the Illalong receiving environment. The character of the L_{A1} impact is unlikely to differ significantly from existing road noise impacts associated with the poor alignment of the Mansfield Street rail overpass.

Tuckers Lane Receiving Environment (R3)

The results indicate that noise impact will comply with the sleep disturbance criteria for all receivers in the Tuckers Lane receiving environment under all significant meteorological conditions.

North Rothbury Receiving Environment (R4)

The results indicate that noise impact will comply with the sleep disturbance criteria for all receivers in the North Rothbury receiving environment under all significant meteorological conditions.

Branxton Receiving Environment (R5)

The results indicate that noise impact will comply with the sleep disturbance criteria for all receivers in the Branxton receiving environment under all significant meteorological conditions.

New England Highway Receiving Environment (R6)

The results indicate that predicted L_{A1} noise levels may be above the sleep disturbance criteria for sensitive receivers to the north of the development along the New England Highway:-

- Under neutral conditions exceedance of the L_{A1} criterion is not expected to occur;

- Under SSW winds the L_{A1} noise impact would likely exceed the sleep disturbance criteria for receivers along the highway. L_{A1} noise levels at receivers on the New England Highway may experience noise levels up to 55dB(A); and
- During periods of temperature inversion L_{A1} noise impact would likely exceed the sleep disturbance criteria for the majority of receivers along the highway. L_{A1} noise levels at receivers on the New England Highway may experience noise levels up to 52dB(A).

While the assessment indicates the sleep disturbance criteria may be exceeded during Stage 3 operations, these results should be interpreted in the context of the ambient noise environment. Analysis of attended monitoring data presented in Appendix II indicates that ambient L_{A1} noise levels from existing transportation sources may reach levels up to 64dB(A). While L_{A1} emissions from the TSF are likely to exceed the criteria with a maximum expected level of 54dB(A), the character of the impact is consistent with that from existing transportation sources, albeit at significantly lower levels.

Summary of Sleep Disturbance Results

In sum, the results indicate that the predicted L_{A1} noise levels may exceed the sleep disturbance criteria at:-

- Receivers at Greta – L_{A1} noise levels may approach 50dB(A) during periods of south-westerly winds.
- Receivers at Illalong - L_{A1} noise levels may approach 55dB(A) during periods of temperature inversion.
- Receivers on the New England Highway - L_{A1} noise levels may approach 55dB(A) during periods of temperature inversion.

It should be noted that these results provide an assessment of 95th percentile L_{A1} noise levels, and compliance with the criteria is likely under all meteorological conditions during the periods of average L_{A1} noise impacts.

It should also be noted that the ambient noise levels in the receiving environment adjacent to the New England Highway already exceed the predicted L_{A1} impact associated with the proposed development by approximately 4dB(A), and will likely mask any contribution from Project Operations.

Table 29 in Appendix C quantifies the impacts above the sleep disturbance criteria for Stage 3 operations for the Project. This has been assessed against a background noise policy which does not account for existing exceedences from transient noise sources that are already present in the locality. Existing transient noise sources within the locality, such as the Main Northern Railway, already generate exceedences to the sleep disturbance criteria. Assessment indicates the Sleep Disturbance Criteria may be exceeded at up to 475 receivers during adverse conditions. These results must be considered in context.

A review of monitoring data for these locations (as presented in Appendix II of Appendix C) indicates these receivers already experience noise levels well in excess of the Sleep Disturbance Criteria due to existing rail pass by events. In particular, receivers in Greta and adjacent to the New England Highway already experience some impacts to the sleep disturbance criteria. The Project will result in some additional sleep disturbance impacts to the receivers directly to the south of the site on Mansfield Street. It is important this only represents approximately 2% of impacted receivers. Pacific National is proposing to prepare a Noise Management Policy in consultation with these impacted receivers to address these potential impacts. This is reflected in the draft SOC's contained for the Project in Section 18 of this report.

The following figures detail the modelled impact predictions of the Project for the L_{A1} Sleep Disturbance criteria.

Figure 30 Predicted L_{A1} Sleep Disturbance Noise Level in Neutral Conditions (Source: Advitech, 2010)

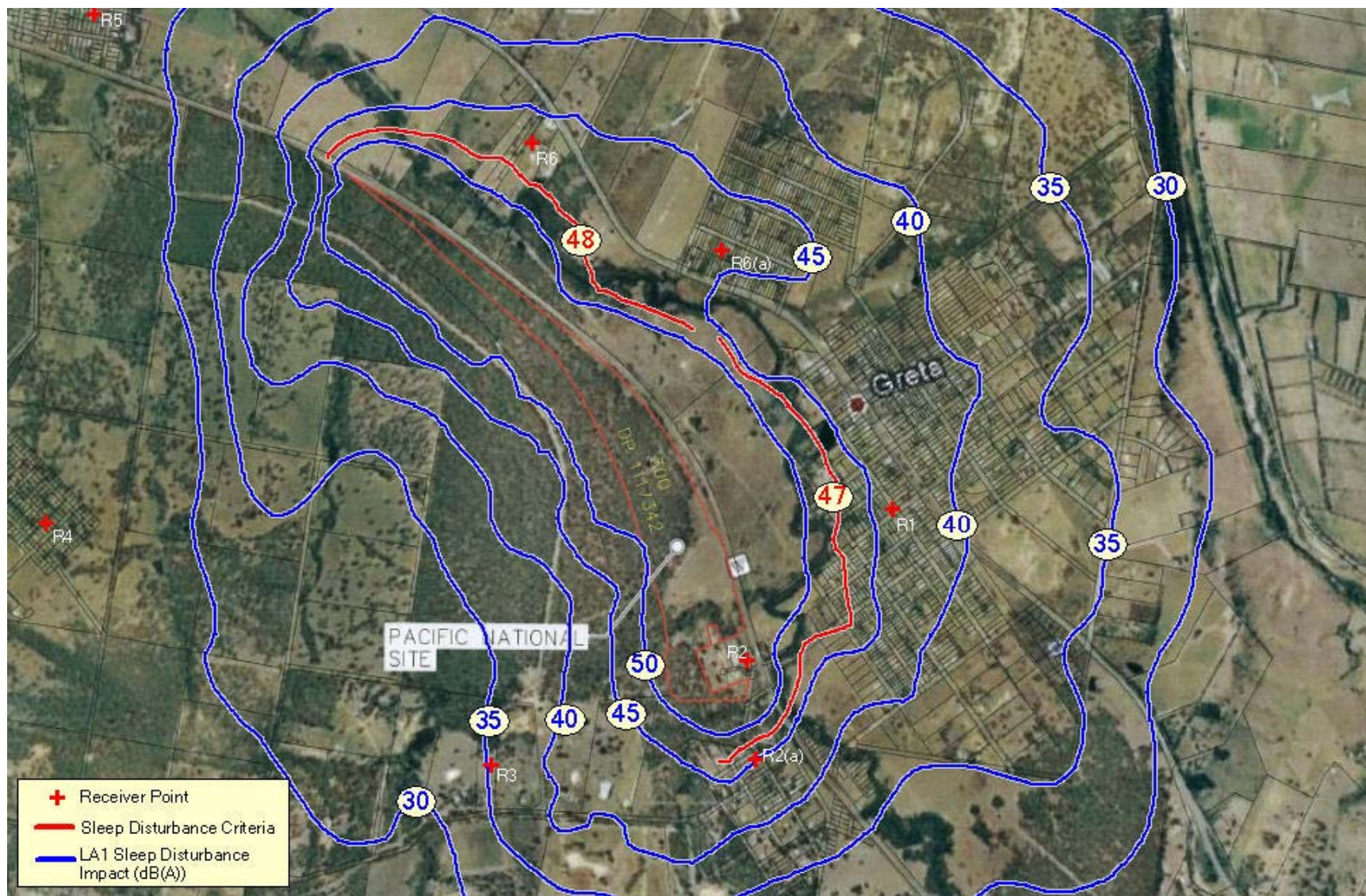


Figure 31 Predicted L_{A1} Sleep Disturbance Noise Level in adverse SSW Conditions (Source: Advitech, 2010)

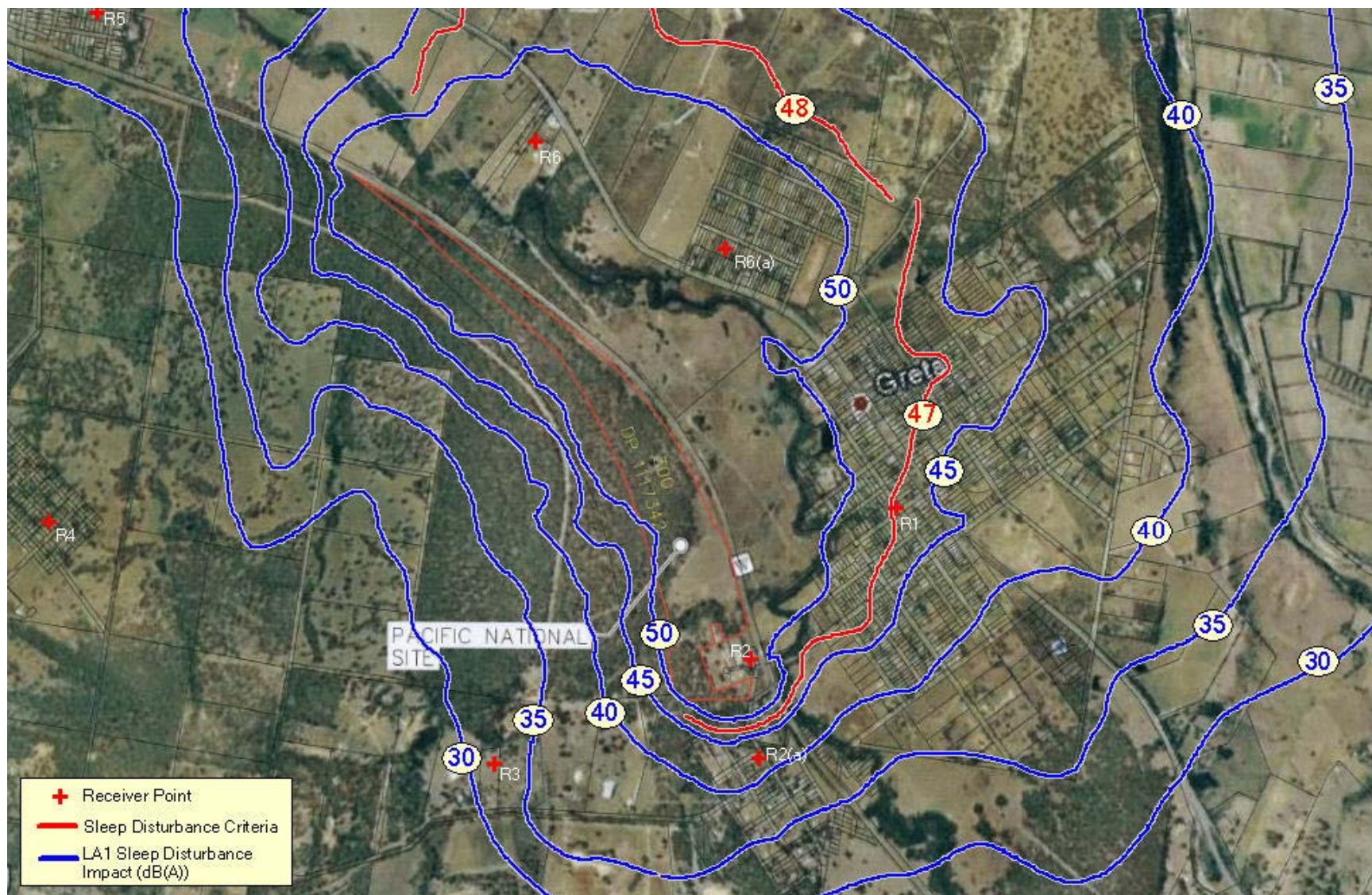
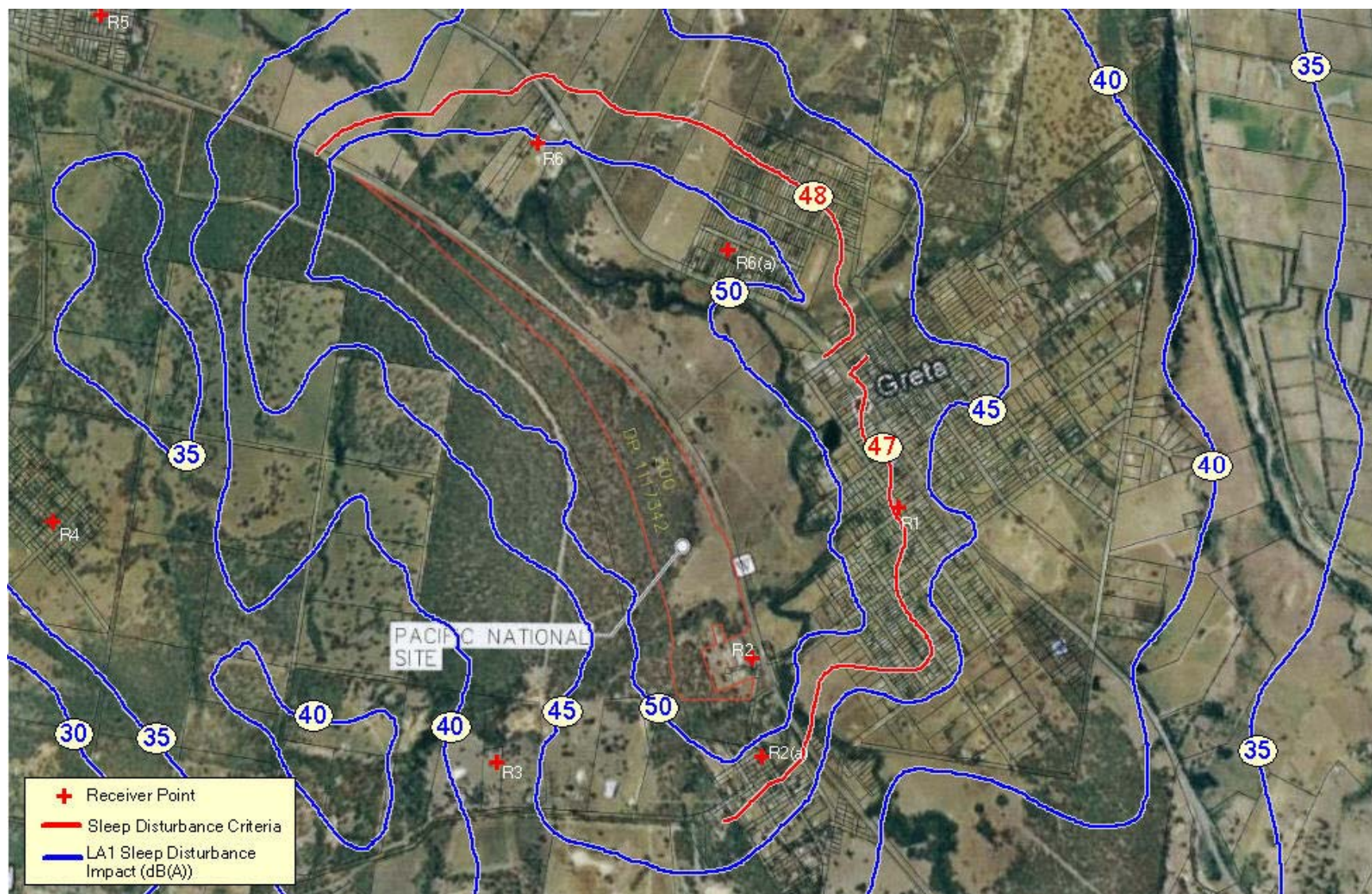


Figure 32 Predicted L_{A1} Sleep Disturbance Noise Level in Adverse Winter Conditions (Source: Advitech, 2010)



9.3.7 **ROAD TRAFFIC NOISE**

As discussed in Section 8 of this report, access to the site for the majority of traffic would be via the New England Highway and Nelson Street. It is important to note that traffic numbers, and hence road traffic noise, on the New England Highway are expected to decrease following commissioning of the proposed Hunter Expressway. The noise impact of this traffic on the existing residents on the New England Highway and Nelson Street was assessed as part of this application.

An assessment of attended and unattended noise monitoring data indicates that the ambient 95th percentile $L_{Aeq,1hour}$ noise levels for receivers on the Nelson Street and Mansfield Street corridor is on the order of 58dB(A). A review of unattended monitoring data indicates that there is no significant diurnal change in the $L_{Aeq,1hour}$ noise levels potentially due to the influence of rail traffic during the night period.

Noise modelling undertaken for the Project found that the traffic generated by the Project may increase predicted $L_{Aeq,1hour}$ noise levels by 0.1 and 0.3db(A) at receivers adjacent to the New England Highway and Nelson Street respectively. Impact predictions in the *Environmental Criteria for Road Traffic Noise* (ECRTN) indicate existing noise levels may be considered acceptable where the increase is less than 2db(A). Therefore it is considered that the impact of road traffic noise generated by the Project is acceptable.

9.3.8 **CUMULATIVE NOISE IMPACTS**

An assessment of cumulative noise impacts was undertaken for the Project based on guidelines established in the *Industrial Noise Policy* and made publically available providing information relating to the assessment of noise impacts associated with the proposed Hunter Expressway and ARTC's third rail track between Maitland and Minimbah. In the absence of DOP or DECCW issued guidelines on quantitative assessment of cumulative noise impacts, this assessment presents as a qualitative review of potential noise impacts. Where noise impacts were not provided for discrete receptors in the referenced noise impact assessments, general extrapolation of impacts was undertaken based on the distance from the source to the receiving environment and the assumption that both rail and road corridors present as a line noise source.

A review of impact predictions indicates that the following receiving environments will experience negligible noise impacts as a result of the Project:-

- Tuckers Lane (south of the Project).
- North Rothbury (west of the Project).
- Branxton (north-west of the Project).

As the impact of the Project on these receiving environments is considered negligible, no further assessment of cumulative noise impacts is presented for these locations.

An assessment of the cumulative acoustic impacts on the remaining receivers is detailed below:-

Table 33 Cumulative Acoustic Impact

INFRASTRUCTURE ELEMENT	ASSESSED CONTRIBUTION DB(A)			
	GRETA RECEIVING ENVIRONMENT (R1)	ILLALONG RECEIVING ENVIRONMENT (R2)	NEW ENGLAND HIGHWAY RECEIVING ENVIRONMENT (R6)	
			SOUTH OF HIGHWAY	NORTH OF HIGHWAY
Hunter Expressway	41	53	55	50
New England Highway	43	N/A	46	46
ARTC Third Rail	48	59	51	50
The Project	36	42	40	42
Ambient $L_{Aeq, night}$	50	57	53	53
Cumulative $L_{Aeq, night}$ (all sources)	50	60	57	53
Cumulative $L_{Aeq, night}$ (without the Project)	50	60	57	53
Amenity Criteria	45	40	45	45

The results presented above indicate the cumulative noise impacts within the locality would not generate cumulative noise impacts exceeding ambient night period noise levels for the Greta Receiving Environment.

The results indicate that the cumulative noise impacts within the locality may generate cumulative noise impacts exceeding ambient night period noise levels for the Illalong Receiving Environment, and the New England Highway Receiving Environment. A review of the contributions from each of the development sources indicates the cumulative noise impact would be dominated by road noise from the Hunter Expressway with a moderate contribution from the rail corridor.

It should also be noted that, the contribution from the Project is not significant in comparison to existing levels of transportation noise, and will have negligible influence on cumulative $L_{Aeq, period}$ noise levels.

9.3.9 VIBRATION

The DEC guideline identifies the Vibration Dose Value (VDV) as the appropriate indicator for the assessment of intermittent vibration impacts. The VDV provides an assessment of accumulated vibration impacts experienced over the duration of the assessment period. The DEC guideline adopts the assessment methodology from BS6472-1992 Guide to evaluation of human exposure to vibration in buildings for determination VDV. Currently no guideline or Australian Standard establishes a vibration criterion for the assessment of structural or cosmetic damage to buildings. The US Federal Transit Administration guideline Transit Noise and Vibration Impact Assessment (1995) provides some guidance on the establishment of vibration damage criteria. The acceptable VDV for intermittent vibration and the structural damage criteria are shown in Table 1 and 2 respectively in Appendix D.

9.3.10 CONSTRUCTION

Due to the transient nature of the impact and the difficulty in evaluating a vibration dose for an activity that may vary significantly with time, the assessment focuses on reviewing potential impacts against the structural damage criteria. Typical vibration levels generated by items of construction plant are shown in Table 11 in Appendix D.

Major earthworks and establishment of final site levels are identified as the major source of potential construction vibration impact, given the requirement for blasting and the significant volume of material to be cut.

For the purposes of this assessment construction works are considered in terms of two major components:-

- **Phase 1:** Major earthworks and establishment of final levels.
- **Phase 2:** Establishment of rail sidings, site infrastructure and ancillary services.

Phase 1 activities that may generate vibration impacts at receivers at the southern end of the site include blasting and construction of the noise barrier. Items of plant that may generate vibration impacts during this phase of the construction works, include blasting across the site and trucks and dozers used to emplace material and shape the noise barrier. Phase 2 activities that may generate vibration impacts at receivers at the southern end of the site include construction of the internal roadway. Items of plant that may generate vibration impacts during this phase of the construction works include truck movements and the use of rollers to finish the road surface.

Blasting

As discussed above, preliminary geotechnical investigations undertaken by Pacific National indicate areas exist within the proposed development site that requires blasting to enable final site levels to be achieved. Blasting will be required to excavate approximately:-

- 40,000m³ of rock between chainages 211250 and 211650; and
- 10,000m³ of rock between chainages 213250 and 213450.

The location of the proposed blasting areas is provided in Figure 33. Minimum separation distances between the proposed blast area and sensitive receivers or critical infrastructure are provided in **Table 34**.

Figure 33 Areas Subject to Blasting

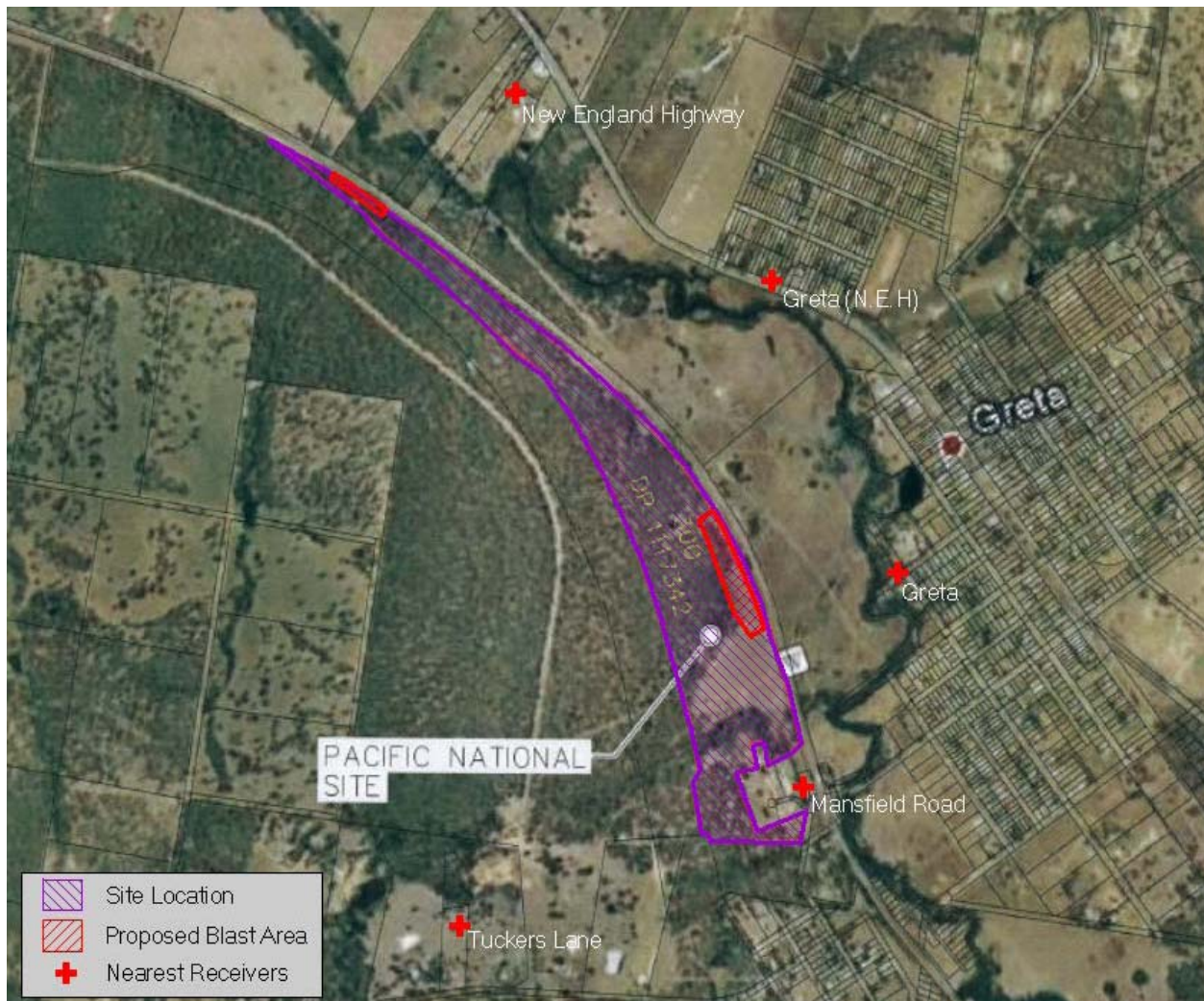


Table 34 Separation Distances between Receivers and Blast Area

RECEIVING ENVIRONMENT	SEPARATION DISTANCE (R), METRES
Greta (nearest resident)	445
Illalong (nearest resident)	390
Tuckers Lane	1360
North Rothbury	2050
Branxton	1690
New England Highway (nearest resident)	540
New England Highway (Greta)	730
Northern Rail Infrastructure (existing)	8

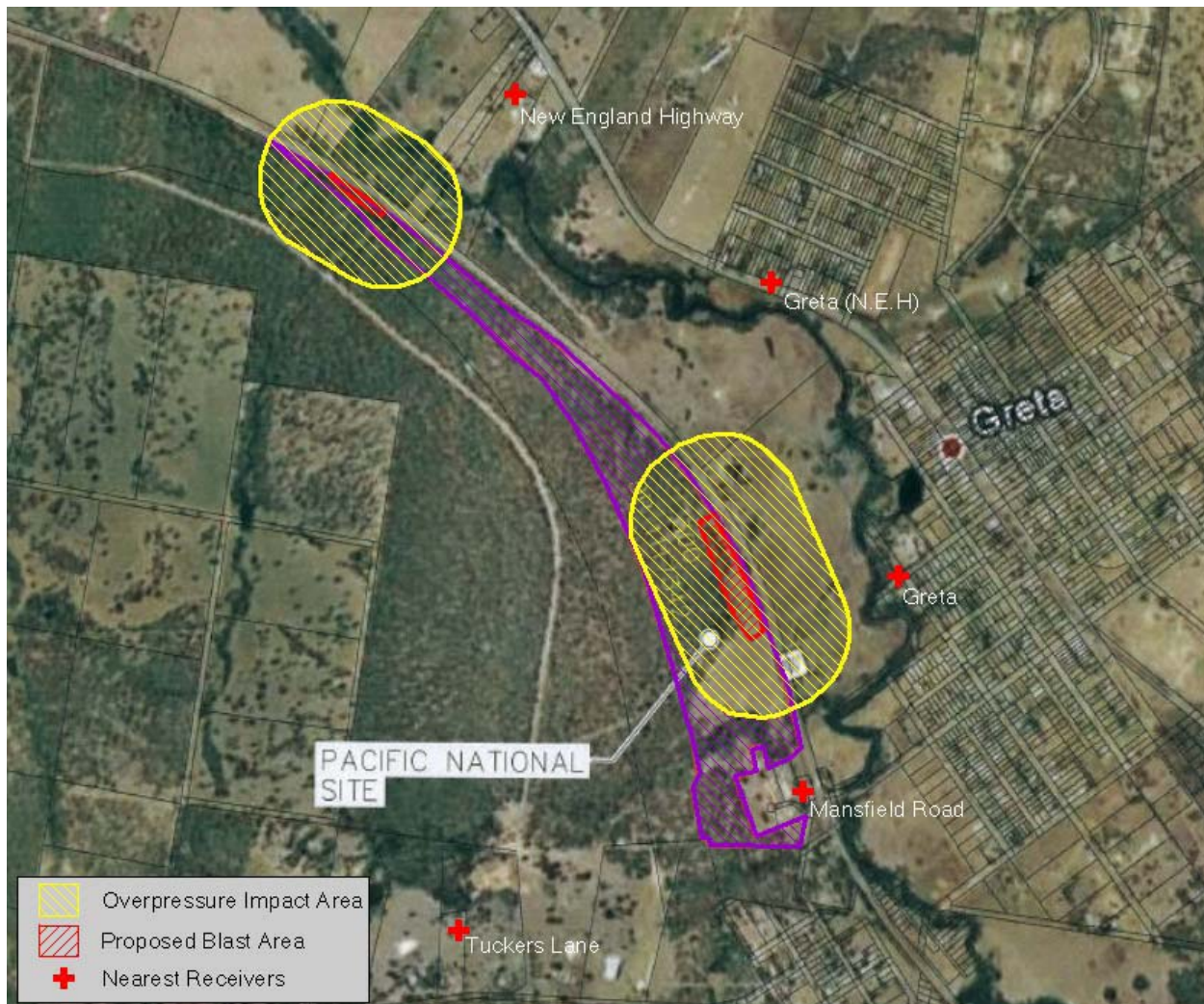
It is proposed that blasting would be undertaken every second day for approximately three months to excavate the estimated 50,000 m³ of rock. Blasts would be undertaken between 9:00am and 5:00pm however, timing would vary depending on the proximity to the Northern Railway and train schedules.

A summary of assessed blast overpressure impacts is presented in **Table 35**. The results indicate that, based on observed separation distances, air blast overpressure levels are unlikely to exceed the human annoyance criteria presented in the ANZEC guideline at adjacent sensitive receivers. It should be noted the assessment applies minimum separation distances and hence presents a conservative assessment of potential impacts. **Table 35** below shows the area likely to experience overpressure impacts exceeding 115dB(Lin).

Table 35 Assessment of Blast Impacts

RECEIVING ENVIRONMENT	SEPARATION DISTANCE (R), METRES	CRITERIA	AIRBLAST OVERPRESSURE (DB(Lin))
Greta (nearest resident)	445	< 115dB(Lin) 95% of blasts Should not exceed 120dB(Lin) at any time	105
Illalong (nearest resident)	390		106
Tuckers Lane	1360		91
North Rothbury	2050		86
Branxton	1690		88
New England Highway (nearest resident)	540		102
New England Highway (Greta)	730		98

Figure 34 Blast Overpressure Impact (Source: Advitech, 2010)



The assessed blast impact results indicate that, based on the observed separation distances, ground vibration levels are unlikely to exceed human annoyance or structural damage criteria at sensitive receivers adjacent to the blast site. Ground vibration levels may exceed the structural damage criterion established in DIN 4150-3: 1999. To address this matter, it is proposed to undertake consultation with ARTC to determine an acceptable impact criterion prior to commencement of construction works. It should be noted that the EA for ARTC's third track proposes to use blasting in the same area and as result this criteria should be able to be achieved.

Other Construction Activities

The worst case vibration impacts during the construction stage of the development are likely to occur during construction of the noise barrier and internal roadway.

During the stage of the development, the separation distances between construction plant and privately owned structures is likely to be in the order of 20 metres. The results of the assessment are presented in **Table 36** below. The results of this assessment indicate predicted PPV impacts fall below the structural damage criteria presented for all building types.

Table 36 Modelled Construction Vibration Impacts (Source: Advitech)

CONSTRUCTION PLANT	PPV AT 10M (MM/S)	PPV VIBRATION LEVEL AT RECEIVER (MM/S)
Rock Breaking (Kerb Breaking)	8	2.8
Dozer	4	1.4
Truck	2	0.7
Roller	6	2.1

The analysis indicates that impacts are unlikely to exceed the structural damage criteria, however, construction works in close proximity to sensitive receivers at the south of the site may be perceptible to persons in this area, as such some mitigation measures have been proposed in accordance with the *Interim Construction Noise Guideline* (DECC, 2009).

9.3.11 OPERATIONAL

The nearest residential receivers are located to the south of the TSF adjacent to the site access on Mansfield Street, Illalong. These receivers are located approximately 150 metres south of the junction of the Main Northern Railway and the arrival track for the TSF. This is the point at which the boundary between vibration impacts associated with the TSF and existing rail sources is defined.

The assessment presents a generalised model for the prediction of rail induced vibration impacts as a function of distance from the centreline of the track. The impact predictions for the proposed development are presented in **Table 37** below.

Table 37 Modelled Vibration Impacts (Source: Advitech)

	SEPARATION (M)	DISTANCE	ENERGY AVERAGE RMS VIBRATION MAGNITUDE (MS ⁻²) ¹
Measured Impact	22		0.0038-0.0117
Modelled Impact ²	22		0.0116
	150		0.0031

Note 1. RMS acceleration values are calculated using the methodology presented in Section 3.3 of the Vibration Impact Assessment Report and assumes a dominant frequency of 30Hz.

Note 2. Modelled impact is based on prediction curve adjusted to be representative of measured impacts.

The results indicate that vibration impacts at residential receivers generated by trains entering the TSF are significantly lower than those generated by trains passing on the Main Northern Railway.

Table 38 presents the estimated vibration dose for receivers adjacent to the TSF based on the modelled vibration magnitude (RMS ms-2) for trains entering the site.

Table 38 Modelled eVDV impact at residential receivers (ms⁻¹⁷⁵) (Source: Advitech)

VIBRATION IMPACT		PERIOD	PASS-BY EVENT	PERIOD EVDV	CRITERIA
RMS Acceleration (ms ⁻²)	0.0031	Day	16	0.032	0.2
Single Event eVDV ¹	0.016	Night	9	0.028	0.13

Note 1. eVDV value is presented for a single pass-by event using the methodology presented in Section 3.3 and assumes a pass-by time of 180 seconds

The results indicate the predicted impact is below the vibration dose criteria for both the day and night periods. As the predicted vibration impact is compliant with the criteria at the nearest sensitive receiver, it is also considered to comply with the criteria at more distant receivers.

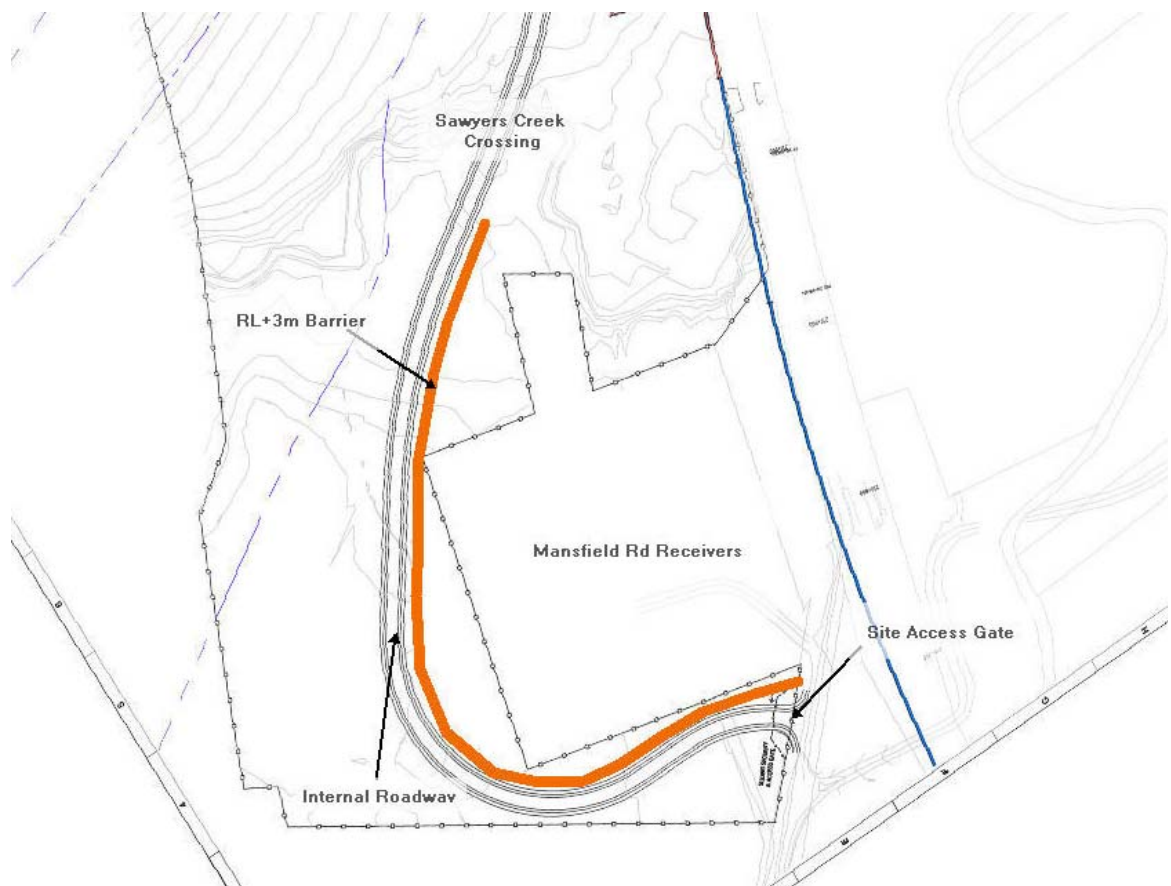
No detailed assessment of potential vibration damage to buildings was undertaken as monitoring data indicates PPV values generated by existing rail impacts on the Main Northern Railway are well below the damage criteria at separation distances exceeding 20 metres. Minimum separation distances between sources of vibration associated within the TSF and structures on adjacent properties are in the order of 170 metres. Assuming the intervening ground types are the same the potential for vibration induced damage to structures is considered negligible.

9.4 MITIGATION MEASURES

The noise modelling undertaken for the Project has been based on a number of assumptions, as outlined in Appendix C. These assumptions have been reflected in the mitigation measures for the Project where relevant, as detailed below. Constructing a barrier to the east of the internal roadway to mitigate emissions from vehicles accessing the site. In concept, the barrier should commence immediately to the north of the site access gate and follow the eastern shoulder of the roadway to the southern edge of the riparian buffer at the Sawyers Creek crossing (as shown in **Figure 35**). The barrier will be approximately 500 metres long and RL+3m in height. The top of the barrier should be located no more than 10 metres from the shoulder of the roadway in order to maximise its efficacy.

Where the available space cannot accommodate the footprint of the barrier, a fence – type barrier or fence-topped earth barrier composite may be constructed.

Figure 35 Concept Design for Proposed Noise Barrier (Source: Advitech, 2010)



9.4.1 CONSTRUCTION

A Construction Noise Management Plan (CNMP) should be developed in conjunction with the detailed construction program such that operational controls may be implemented to minimise potential noise impacts during the construction stage.

The Interim Construction Noise Guideline (DECC, 2009) provides recommendations for the management of noise from construction works and examples of common mitigation techniques.

The Interim Construction Noise Guideline (DECC, 2009) identifies noise and vibration control practices that may be applied to minimise construction related impacts on the community. Examples of strategies and work practices that may be relevant management of potential vibration impacts include:-

- Universal Work Practices:-
 - Ensure employees and contractors are appropriately trained in the use of equipment in ways to minimise generation of noise and vibration.
 - Ensure site managers regularly check the site and nearby residences for problems such that solutions can be quickly applied.
- Consultation and Notification:-
 - Provide information to neighbours before and during construction.
 - Maintain good communication between the community and project staff.
 - Provide a contact telephone number for community enquiries during the works.
 - Have a documented complaints handling process, including a register of received complaints, actions and resolution.
- Plant and Equipment:-
 - Ensure the correct plant is used for the purpose.
 - Ensure equipment is maintained in good working order.
- Work Scheduling:-
 - Schedule potentially high impact activities during less sensitive periods and provide periods of respite. An example of such scheduling may be to undertake high impact activities only between 9:00am to 12:00pm and 2:00pm to 5:00pm.
- At Residences:-
 - Undertake building condition surveys at potentially impacted dwellings prior to commencement of vibration generating works to provide a reference against which impacts may be assessed.

Operation

Additionally, a number of operational controls are recommended for the management of noise impacts including:-

- Restricting heavy vehicle movements during the night period. Heavy vehicle access to the site during the night period may lead to exceedence of the PSNL by up to 11dB(A), and exceedence of the sleep disturbance criteria by up to 15dB(A).
- Not scheduling noise generating maintenance activities during the night period.
- Undertaking maintenance activities on the wagon siding only during the day period.
- The facility has been designed to minimise the requirement for shunting activity. Should this be required, operational controls would be implemented during shunting, coupling, take off and stopping of trains to minimise the generation of impulsive noise associated with impact between empty wagons.
- Ensuring locomotives and wagons are maintained such that they do not generate excessive levels of noise.

9.4.2 VIBRATION

The following mitigation measures are proposed to manage potential blast impacts from the site.

Consultation with ARTC to determine an acceptable impact criterion should be undertaken prior to commencement of construction works. Detailed blast designs would then be undertaken to ensure compliance with this criterion.

While the assessment indicates blasting activities are likely to comply with the relevant criteria, impacts may be perceived by sensitive receivers adjacent to the site. AS2187.2-2006 provides guidance on methods to manage blasting in such a way as to minimise ground vibration and overpressure impacts, including:-

- reducing the maximum instantaneous charge;

- using appropriate delays;
- establishing blast times in accordance with prevailing meteorological conditions;
- keeping face heights to a practical minimum;
- optimising blast design;
- ensuring stemming types and lengths are adequate; and
- orienting blasts away from receivers (where possible).

The construction contractor shall prepare a Blast Management Plan, and include provisions for:-

- monitoring overpressure and ground vibration;
- feedback loops to modify blast design where monitoring indicates impacts are above the criteria; and
- receiving, investigating and responding to complaints.

9.5 CONCLUSION

A review of attended and unattended background monitoring for the site and locality indicate that the existing noise environment is dominated by road and rail traffic on the New England Highway and Main Northern Railway. The contribution from these noise sources is unlikely to decrease in the future as increasing traffic volumes utilise these major transportation corridors. The character of the noise environment at this location is likely to experience change following extension of the F3 freeway to Branxton and construction of a third track in the main northern railway.

A review of attended monitoring results indicates the receiving noise environments adjacent to the proposed development are characterised by a mix of Urban, Suburban and Rural receiver types depending on the proximity to transportation corridors. The PSNL were ultimately established on the basis of the intrusiveness criterion due to the distribution of observed background noise levels.

Noise modelling was undertaken for the Project which incorporated a number of mitigation measures in the assumptions for the model, including the construction of an approximate 3 metre noise mound between the proposed access road and the residents at the southern end of the site.

Noise modelling indicates that worst case impacts for receiving environments in Greta, Illalong and on the New England Highway comply with the day and evening period PSNL under all significant meteorological conditions.

However, as the Project is to operate 24 hours a day, the night period PSNL becomes the limiting criterion for the assessment of noise impacts. Accordingly, some residual impacts are expected, in particular:-

- Receivers in Greta may experience noise levels up to 3dB(A) above the night period PSNL during periods of south-westerly winds and temperature inversion.
- Receivers in Illalong may experience noise levels up to 5dB(A) above the night periods PSNL under neutral conditions and during periods of temperature inversion.
- Receivers north of the site on the New England Highway may experience noise levels up to 4dB(A) above the night period PSNL during periods of north-westerly winds.

While operations may be audible at times, it is considered the character of noise impacts generated by the Project is considered to be consistent with the character of the existing noise environment at Greta.

Impact predictions associated with the construction stage of the proposed development indicate exceedences may be observed at receivers near the site access on Mansfield Street. Noise impacts at this location are expected to approach the highly affected management level during construction of the internal access road and noise barrier. While noise levels may be significant at times, the intent of the works, to provide a long term solution for the mitigation of noise from site operations, coupled with the temporary nature of the impact should be considered in evaluating the impact.

It is also important to note that the cumulative acoustic impact assessment analysed the contributions from the Project, the proposed Hunter Expressway and ARTC's third rail, and found that the cumulative noise impact would be dominated by road noise from the Hunter Expressway with a moderate contribution from the rail corridor. It should also be noted however, the contribution from the Project is not significant in comparison to existing levels of transportation noise, and will have negligible influence on cumulative $L_{Aeq, period}$ noise levels.

The results of background vibration monitoring indicate estimated vibration dose values associated with the passage of trains on the Main Northern Railway are on the order of 0.02 to 0.05 ms-1.75.

The maximum peak particle velocity result associated with train a pass-by event was 0.5 mm/s.

These results were used to calibrate the vibration impact prediction curve for locomotive powered freight and passenger rail impacts provided by the US Federal Transit Authority.

Additional corrections were applied to this curve to account for lower speeds and special track work encountered as trains enter the Project.

The results of this model indicate that receivers 150 metres to the south of the arrival track may experience eVDV on the order of 0.03 ms-1.75, well below the 0.13 ms-1.75 criteria for the night period.

The vibration results indicate Project operations would comply with the criteria for both human comfort and annoyance and structural damage to buildings. Due to the transient nature of the impact and the difficulty in evaluating a vibration dose for an activity that may vary significantly with time, assessment of potential construction vibration impacts focus on the structural damage criteria. In lieu of a published Australian Standard or guideline for this impact, assessment was undertaken against the building damage criteria presented in the US FTA Guideline Transit Noise and Vibration Impact Assessment (1995). The analysis presented in Section 9.3 indicates that construction vibration impacts will comply with the structural damage criteria for all building types at separation distances exceeding 20 metres. Although considered compliant with the structural damage criteria, construction vibration impacts may remain perceptible by members of the community near to construction works.

A range of potential mitigation measures outlined in the Interim Construction Noise Guideline (DECC, 2009) may be applied to minimise vibration impacts and manage the response where impacts are perceptible by the community.

10 HAZARDS AND RISKS

10.1 INTRODUCTION

The DGR's identified hazards and risks as a key issue for the Environmental Assessment. This section identifies the potential hazards and risks associated with the Project for construction and operation including dangerous goods storage, bushfire, mine subsidence and Acid Sulphate Soils, as well as the mitigation measures to reduce any potential impacts. Any residual impacts are also discussed where applicable. The management measures are further detailed in the draft SOC contained in Section 18. Table 39 below outlines the Director-General's requirements and where they have been addressed in this report. Advitech prepared a Preliminary Risk Screening Assessment for the Project a copy of which is contained within Appendix E. A Bushfire Report was also prepared for the Project and is contained within Appendix H. Douglas Partners undertook a number of Geotechnical Studies for the Project which are contained within Appendix F, G, K and S.

Table 39 Director-General's Requirements for Hazards and Risks

DIRECTOR-GENERAL'S REQUIREMENTS	SECTION ADDRESSED
Consideration of the hazards and risks associated with the use, storage and transportation of dangerous goods consistent with the Department's guideline <i>Applying SEPP 33</i> , and if relevant, a <i>Preliminary Hazard Analysis</i> in accordance with the <i>Department's Hazardous Industry Planning Advisory Paper No. 6, Guidelines for Hazard Analysis</i> ;	Sections 10.2.1 and 10.3.1 Appendix E
Assessment of bushfire hazards, including the identification of access and egress from the site and evacuation routes; and	Sections 10.2.2, 10.3.2, 10.4.3 Appendix H
Potential risks and impacts associated with mine subsidence.	Sections 10.2.3, 10.3.3, 10.4.2 Appendix G

10.2 DESCRIPTION OF EXISTING ENVIRONMENT

10.2.1 DANGEROUS GOODS

As detailed above, the site is currently vacant. No hazardous materials are currently stored, or known to occur on site. The surrounding land uses which may be impacted on by the presence of dangerous good on site are detailed in **Table 40** below.

Table 40 Surrounding Land Uses

LAND USER	DISTANCE	DIRECTION	LAND USE CATEGORY ¹
Branxton Residents	400	NW	Residential
East Branxton Residents	1,000	N	Residential
Greta Residents	400	E	Residential
Closest Resident	Adjacent to boundary	SE	Residential
Southern Resident	300	S	Residential
North Rothbury Residents	1,800	W	Residential
Branxton Public School	1,000	NW	School
Greta Public School	500	E	School
Greta Sporting Complex	600	E	Sporting Complex
Branxton Light Industrial Area	1,200	NW	Industrial

¹ - Land use category as defined in HIPAP No. 4

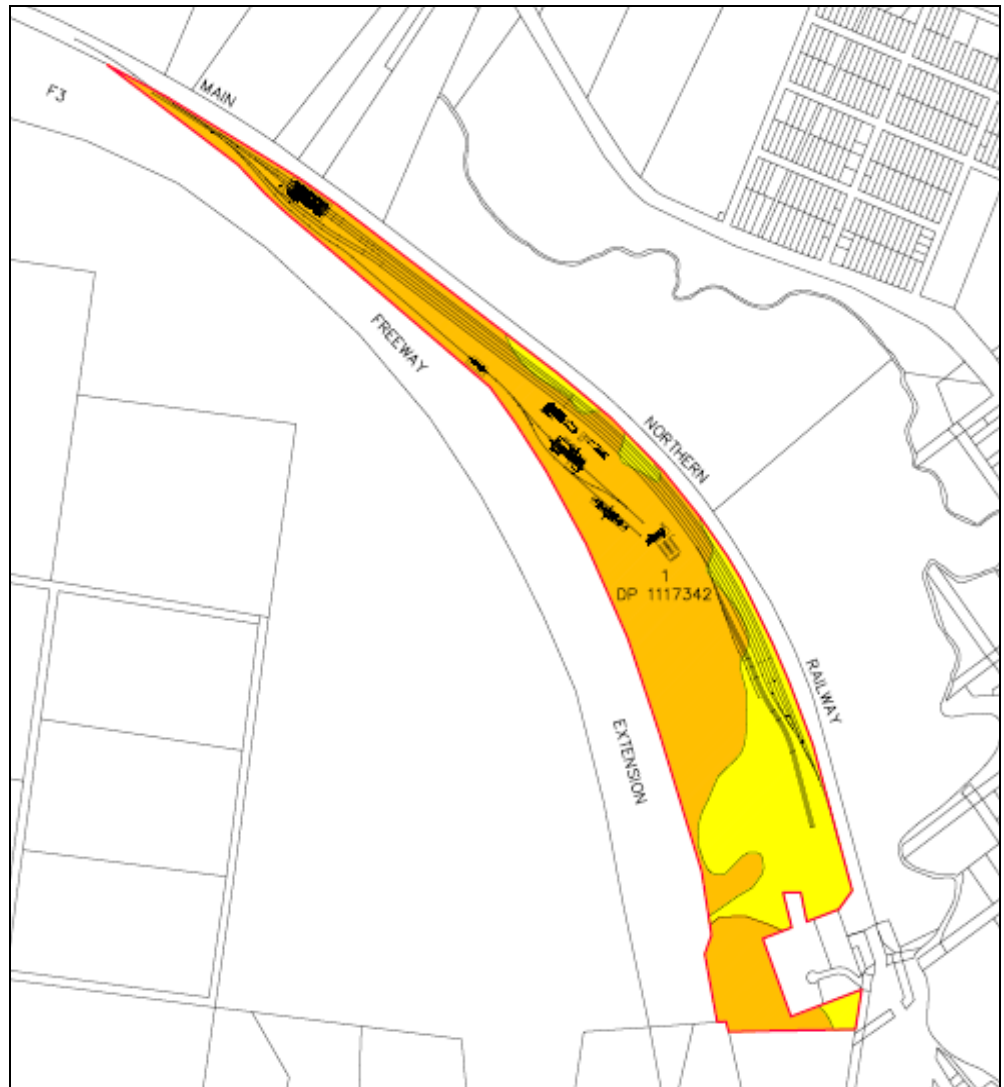
10.2.2 Bushfire

The site is identified as being bushfire prone land in the Cessnock Council Bushfire Prone Land Maps (BFPLM). A bushfire assessment was undertaken to manage the bushfire risk on site. This assessment considered access and egress from the site, the storage of materials, evacuation routes and setbacks from any bushfire hazard on site.

The BFPLM shows that the entire site is bushfire prone and contains Category 1 and Category 2 vegetation.

The following figures details the extent of bushfire prone vegetation and the proximity to the proposed site facilities.

Figure 36 Extent of Bushfire Prone Vegetation on Site and Proximity to Proposed Site Facilities



Category 1 Bushfire Prone Vegetation extends to the west and southwest across the adjoining Hunter Expressway road corridor and the adjoining private lands. Category 2 Bushfire Prone Vegetation is located in the south eastern portion of the site, and along a portion of the eastern boundary.

10.2.3 Mine Subsidence

Douglas Partners prepared a Geotechnical Investigation (October 2009) and a supplementary report addressing the DGR's for the site. A copy of these reports are provided in Appendix F and G. Douglas Partners also prepared a Preliminary Contamination Report (December, 2009) prepared for the Project, a copy of which is contained within Appendix K. A Report on Mine Subsidence Assessment of Pothole Risk was also undertaken and is contained in Appendix S.

The regional geology of the locality is discussed in Section 12. Although the Greta Coal Measures consists of four seams, the site is underlain by shallow workings in the Greta Seam which is known to consist of two splits in the vicinity of Greta.

Several depressions are located on the site, generally close to the Main Northern Railway and are to be subject to additional geotechnical and archaeological investigation. The number and spacing of the shafts is closer than is normally observed even when collieries were operating at shallow depths. It is extremely unlikely that such a large number of shafts would have been sunk through generally strong sandstone and conglomerate to such depths.

Two elongated shallow trough features are also present on site. These features have their long axis aligned in a north south direction. The southern most of these, at approximate Chainage 212 090 was about 8 metres wide and 50 metres in length. Approximately 7 metres from the northern end of this trough, a circular 'shaft' of about 3.4 metres in diameter had been excavated through or adjacent to a sandstone crop. These appear to be a result of purposeful excavation rather than subsidence. However, if the shafts are unrecorded workings of the Greta Seam, the trough like depressions could be abandoned adits of possible pit falls over shallow workings however, this is unlikely.

Earlier geotechnical reports identify that these depression may have been 'shafts' or 'subsidence troughs'. It is apparent from further investigation that these features are neither shafts, adits or mine subsidence features, but rather are shallow excavations dug for an undetermined purpose. The only geotechnical constrain on development is that these features contain incontrolled and sometimes soft, wet filling.

Where these features are present beneath structures, roads or railway tracks the infilled material should be over excavated to the base of the prior excavation and backfilled with engineered filling.

As discussed above, mine workings are present beneath the site, with the depth of cover to workings ranging from about 10 metres in the south portion of the site, to about 200 metres in the north-west corner of the site. There is an ongoing risk of pothole subsidence in the southern portion of the site for areas with less than about 30 metres cover. Additionally, a coal seam outcrops in the southern part of the site.

Pothole subsidence occurred in the southern portion of the site near the north western boundary of Lot 3 DP 882276 in February 2009. A large pothole developed along with four other smaller holes running south away from the large hole. The MSB reported the surface expression of the pothole as about 30 metres long, 15 metres wide and up to about 10 metres deep, however, it is noted that it was subsequently backfilled by the MSB without undertaking survey to establish its exact location or dimensions. The MSB indicated that there were two previous issues in the same immediate area as the February pothole in 2005 and 2008. It is unclear why the subsidence history only started in 2005.

10.3 **ASSESSMENT OF POTENTIAL IMPACTS**

10.3.1 **DANGEROUS GOODS**

The Project would store a variety of hazardous substances including:-

- Diesel
- Oil
- Coolant
- Detergent
- Engine degreaser
- LPG
- Paint

A preliminary risk screening of the proposed development is required under SEPP 33 to determine the need for a Preliminary Hazardous Assessment (PHA). The PHA was undertaken based on the current design.

The preliminary screening assesses the storage of specific dangerous goods classes that have the potential for significant off-site effects. Specifically, the assessment involves the identification of classes and quantities of all dangerous goods to be used, stored or produced on site with respect to storage depot locations.

Should the risk level exceed the criteria of acceptability, or if the controls are assessed as inadequate to prevent offensive impacts on the surrounding land users, the development is classified as 'hazardous industry' or 'offensive industry' respectively and may not be permissible within most industrial zones in NSW.

A development may also be considered potentially hazardous with respect to the transport of dangerous goods. A proposed development may be potentially hazardous if the number of generated traffic movements (for significant quantities of hazardous materials entering or leaving the site) is above the cumulative annual or peak weekly vehicle movements. If the development's transportation of dangerous goods exceeds the thresholds a route evaluation study should be completed in accordance with the route selection guidelines prepared by the DOP.

Preliminary Risk Screening

The following tables summarises the proposed inventory of dangerous goods in accordance with the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (ADG Code), and compares the total storage quantity against the storage screening threshold in Table 3 and Figures 6 and 9 of *Applying SEPP 33 (DUAP, 1994)*.

Table 41 Dangerous Goods Inventory for the Project

SUBSTANCE	ADG CLASS	PACKAGING GROUP	TOTAL STORAGE CAPACITY (M ³)	SCREENING THRESHOLD	
				THRESHOLD QUANTITY (M ³)	DISTANCE TO BOUNDARY (M)
Diesel	C1	-	2,000,000	-	-
Oil	C2	-	20	-	-
Paint	3	II	0.2	2	5
LPG	2.1	-	0.5	16	-
Coolant	NA	-	0.6	-	-
Detergent	NA	-	0.6	-	-
Engine Degreaser	NA	-	0.2	-	-

The proposed paint storage is well below the screening threshold for Class 3 substances of 2m³ and is therefore not considered potentially hazardous. Similarly, the LPG is also well below the screening threshold for LPG of 16m³ and therefore is also classified as not potentially hazardous. Diesel and oils are classified as combustible C1 and C2 respectively and are only classified as dangerous goods Class 3 substances if they are stored with Class 3 substances. Due to the size of the site and the relatively small volume of paint to be stored, careful planning of the paint storage would be considered so that there is sufficient distance from the paint to the diesel and oil storage.

Dangerous Goods Transport Screening

Applying SEPP 33 states that proposed developments may be deemed potentially hazardous if the numbers of generated traffic movements, for significant quantities of dangerous goods entering and leave the site, are above the cumulative vehicle movements shown in Table 2 of the guideline. The volumes and transport frequency of dangerous goods associated with the proposed site are presented in the following table.

Table 42 Estimated Vehicle Movement of Dangerous Goods

SUBSTANCE	ADG CLASS	NO. DELIVERIES PER ANNUM	TYPICAL QUANTITY PER DELIVERY (M ³)	SCREENING THRESHOLD	
				ANNUAL MOVEMENTS	QUANTITY PER LOAD (TONE)
Paint	3	3	0.1	750	5
LPG	2.1	3	0.1	500	2

Paint would be delivered independently of diesel and therefore, it is only the paint and LPG that require inclusion in the transport screening. The amounts of paint and LPG that would be delivered for the Project are well below the quantity and annual movement thresholds for each relevant dangerous goods class and therefore, the development is not classified as potentially hazardous with respect to the transport of dangerous goods.

Storage Quantity Screening

The proposed paint storage is well below the screening threshold for Class 3 substances of 2m³ and therefore is not considered potentially hazardous. Similarly the LPG is also well below the screening threshold for LPG of 16m³ and therefore is also classified as not potentially hazardous.

Diesel and oil are classified as combustible C1 and C2 respectively and are only classified as dangerous good Class 3 substances if they are stored with Class 3 substances. Due to the size of the site and the relatively small volume of paint to be stored, careful planning of the location of the paint storage will be considered to ensure there is sufficient distance from the paint to the diesel and oil storage areas.

The detailed design phase of the Project would ensure compliance with the relevant Australian Standard(s). AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids provides guidelines as to adequate separation distances between flammable and combustible storage depots. To this effect, the diesel tank would be located at least one-sixth of the diameter of the tank or 1 metre, whichever is greater, from any other flammable or combustible storage depot.

The oil would be located at least 1 metre from any other flammable or combustible storage depot and the paint would be located at least 3 metres from any other flammable or combustible storage depot.

The SEPP33 screening and the transport screening indicate that the development is not classified as potentially hazardous and therefore would not require the preparation of a PHA or any further investigations. The concept design for the Project has been designed to meet the minimum separation distances required between diesel/oils and paint, and other dangerous goods. The detailed design for the Project would take into account the results of the SEPP 33 screening and the transport screening. This would ensure that minimum separation distances are met, and maintained, on site.

The development is therefore considered suitable with respect to the surrounding land users and will pose minimal risk to its neighbours.

10.3.2 Bushfire

The Project has the potential to impact on bushfire hazards if not properly managed. Due to the nature of the proposed land use (being non-residential or non-special fire protection purpose development) the Project has been assessed under the provisions of Section 4.3.6(f) of *Planning for Bushfire Protection 2006*. The Building Code of Australia (BCA) details the requisite Defendable Space requirements for the Project. The layout of the facility co-locates the Locomotive Maintenance; Wheel Lathe; Road Vehicle Service Centre; Wagon Maintenance; Fuel Storage; and Administration facilities in the centre of the site. This location limits the exposure of this part of the Project to fires which may occur in retained vegetation on the land to the southwest.

The Locomotive Wash Facility is located to the northwest of the central complex of buildings facilities, adjacent to the south-western boundary, where it would be exposed to the impacts of bushfires occurring in the retained vegetation within the proposed Hunter Expressway road corridor.

The Provisioning Shed is located in the north-western corner of the site and will also be exposed to the impact of bushfires which may occurring in the future Hunter Expressway road corridor.

Bushfire hazard management would be undertaken on site. The intent of bushfire hazard management is to prevent flame contact with a structure, reduce radiant heat to below ignition thresholds for various elements of a building, to minimise the potential for wind driven embers to cause ignition and to reduce the effects of smoke on occupants and fire fighters.

The following table details the defendable space requirements to the buildings and facilities on site from the south-west aspect, as all other parts of the Project would be developed and maintained as part of the Project and would therefore, not contain a bushfire risk. The exception is the administration building and wheel lathe facility which would be exposed from the south and southeast, and the provisioning facility which would be exposed from the northwest.

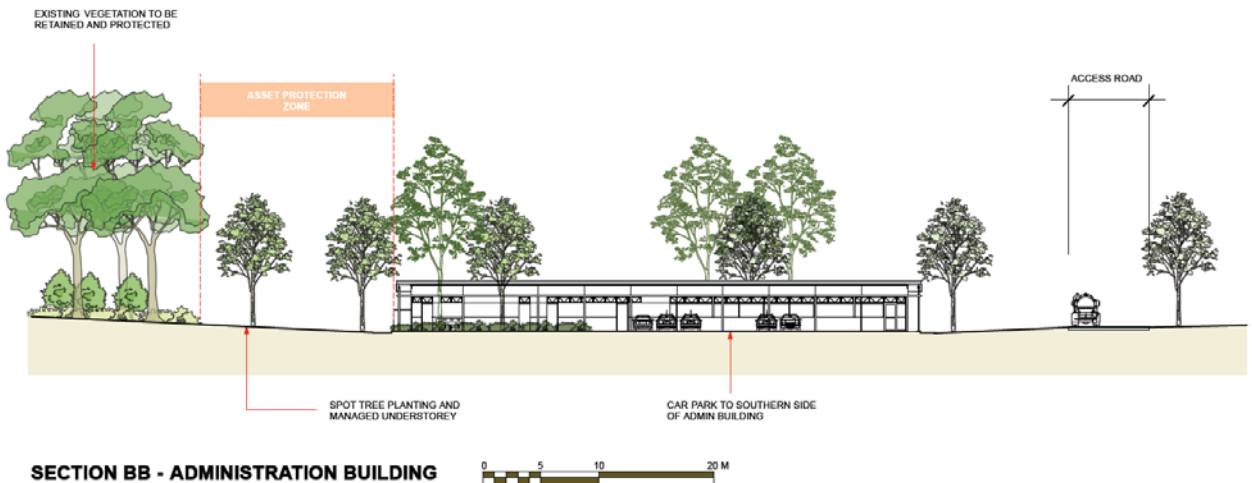
Table 43 Provision of Defendable Spaces to the Project

ASPECT	VEGETATION WITHIN 140M OF DEVELOPMENT	PREDOMINANT VEGETATION FORMATION CLASS (TABLE A2.1 OF PLANNING FOR BUSHFIRE PROTECTION 2006)	EFFECTIVE SLOPE OF LAND FOR 100M FROM BUILDING	FLAME ZONE WIDTH DETERMINED BY CALCULATION	MINIMUM WIDTH OF DEFENDABLE SPACE TO THE PROPOSED BUILDINGS
Southwest of the facilities on site	Lower Hunter Spotted Gum – ironbark Forest	Forest	3 degrees upslope to the southwest	17m flame length for forest vegetation on 3 degree upslope to the southwest	Defendable space of minimum 17m to be provided to the southwest of the locomotive wash facility, locomotive maintenance facility, wheel lathe, administration building and provisioning shed
South of the Administration facility and wheel lathe facility	Lower Hunter Spotted Gum – ironbark Forest	Forest	3 degrees upslope to the south	17m flame length for forest vegetation on 3 degree upslope to the south	Defendable space of minimum width 17m to be provided to the south of the wheel lathe and administration building
Southeast of the administration facility and wheel lathe facility	Lower Hunter Spotted Gum – ironbark Forest	Forest	Level to the south	21m flame length for Forest vegetation on level land to the southeast	Defendable space of minimum width 17m to be provided to the southeast of the administration facility and wheel lathe facility
Northwest of Provisioning Shed	Lower Hunter Spotted Gum – ironbark Forest	Forest	Level to the northwest	21m flame length for Forest vegetation on level land to the northwest	Defendable space of minimum of width 21m to be provided to the northwest of the provisioning shed.

These defendable space widths are required to minimise actual flame contact of the facilities on site and to reduce the level of radiant heat exposure on the buildings. The management of the defendable spaces would comply with the recommendations of Appendix A5.4 and Appendix A5.5 of *Planning for Bushfire Protection 2006* and *Standards for Asset Protection Zones*.

The following figure provides a cross section of the administration building and the proposed defendable space.

Figure 37 Proposed Defendable Space Zone for Administration Building (source: Moir Landscape Architecture)



In addition to flame contact and radiant heat risks, there is also a possibility that burning embers from a bushfire event in the bushfire prone vegetation may impact on the buildings. As such, in addition to the provision of minimum defendable space it is proposed that the buildings on site would be constructed to comply with Level 3 construction specifications as defined by Australian Standard AS 3959 – 1999 Construction of Buildings in Bushfire Prone Areas. A number of other mitigation measures are also proposed to reduce the risk of ember attack.

The access road servicing the Project has been designed to accommodate heavy rigid and articulated vehicles, therefore it would provide suitable access for fire-fighting appliances similar to NSW Rural Fire Service Category 1 Tankers and NSW FB Composite and Aerial Appliances. This road is also suitable, and would be used for, evacuation purposes if required. Access to the bushfire prone vegetation on site is available via the service roads to the facilities on the site.

Reticulated water supply is available from the Hunter Water mains located in Mary Street.

The layout of the Project includes provision of onsite static water supply tanks for fire-fighting operations. The fire-fighting water supply system to the buildings would comply with the BCA and AS 2419.1 – 2005.

In addition to water supply a number of management plans would be prepared for the Project, including:-

- An Evacuation Plan which addresses the protocols necessary to protect the occupants of the Project against the defined emergencies which may impact upon the site, including bushfire.

The evacuation plan will take into account the following documents:-

- Australian Standard 3745 (2002) – “Emergency Control Organisation and Procedures for Buildings, Structures and Workplaces”;
- Australian Standard 4083 (1997) – “Planning for Emergencies - Health Care Facilities”; and to a lesser extent
- NSW Rural Fire Service – “Guidelines for the Preparation of Bush Fire Evacuation Plans”.
- A Plan of Management which addresses the likely impact from the identified emergencies, on the assets on the site so as to minimise loss/damage to the infrastructure and movable assets.
- A Bushfire Management Plan which provides the protocols for the management of combustible fuels in the retained Lower Hunter Spotted Gum-Ironbark Forest.

The following table details the extent to which the Project complies with the deemed-to-satisfy provisions of *Planning for Bushfire Protection 2006*.

Table 44 Compliance of the Project with Planning for Bushfire Protection 2006

BUSHFIRE PROTECTION MEASURE	COMPLIANCE WITH THE DEEMED-TO-SATISFY PROVISIONS OF <i>PLANNING FOR BUSHFIRE PROTECTION 2006</i>	
Asset Protection Zone/Defendable Space Setbacks	Yes	Widths of the Defendable Spaces to the proposed buildings comply with the minimum 'flame zone' setback width required by the NSW Rural Fire Service.
The siting and adequacy of water supplies for fire fighting	Yes	Hydrant supply to be installed in accordance with AS 2419.2 – additional on site static fire-fighting water supply provided in accordance with the BCA requirements.
Design of public roads	Yes	Existing and proposed public roads and proposed internal access roads comply with the specifications of Section 4.1.3(1) and (2) of <i>Planning for Bushfire Protection 2006</i> and provide satisfactory emergency access for fire-fighting purposes.
Design of fire trail network	N/A	No fire trail network required.
Adequacy of emergency response access and egress	Yes	Proposed internal road network provides safe, two-way access/egress for emergency service vehicles with the bushfire risk reduced through the implementation of fuel management protocols in accordance with the Bushfire Management Plan.
Adequacy of bushfire maintenance plans and fire emergency procedures	Yes	A Bushfire Management Plan, Plan of Management and Emergency Evacuation shall be prepared.
Building construction standards	Yes	Construction standards recommended in order to minimise radiant heat impact and ember entry into the buildings.
Adequacy of sprinkler systems and other fire protection measures to be incorporated into the development	N/A	BCA fire protection measures to be implemented including hydrant supply, booster system and static water supply for fire-fighting operations. An external sprinkler dousing system shall be installed to the fuel storage and water storage areas
Emergency Management	Yes	An Evacuation Plan shall be prepared.

10.3.3 **MINE SUBSIDENCE**

Mine subsidence could potentially impact on both natural and constructed surface and sub-surface features on the site, including buildings, if not managed properly. The NSW Department of Primary Industries (DPI) reports that the management of mine subsidence impacts requires an understanding of fundamental aspects of mine subsidence. The occurrence, nature, severity, duration or reparability of mine subsidence impacts depend strongly on the magnitude/nature of subsidence, and the nature of the environmental system or man-made structure in question.

Douglas Partners sourced record traced 288 which identified the seam which was worked as the lower split of the Greta seam and showed that the seam was dipping at 1 in 5 or 11 degrees to 296 degrees. This seam was compared to the surface contour shown on the Greta 1 to 25,000 topographical maps and from this comparison structure contours were prepared showing the approximately depth to the top of the coal seam. The structure contours were compared to surface topography and used to prepare isopachs showing the depth to the top of seam which were used during development on the concept design.

Pothole subsidence generally is considered to be a potential risk from workings of depths in the order of 20 metres, although in the case of some critical development, the Mine Subsidence Board has considered the risk to depths of up to 30 metres.

In view of the abnormally large dimension of potholes which have occurred on the site, together with the uncertainty as to the extent of pillar by undergoing fires, it is not considered feasible to adopt pothole subsidence design (where structures are designed to span possible potholes) on this site. The large size of the February 2009, pothole subsidence may propagate to a height exceeding the depth of 20 metres commonly assumed to be the limit of pothole subsidence over first workings in the Newcastle Coal Fields. Because of these uncertainties, a conservative value of 40 metres cover has been adopted as the limit of pothole risk on this site.

All buildings and workshops on site have been sited to the north west of the 40 metres isopach on site. Parts of the access road servicing the site, as well as the rail embankment are located on land with less than 40 metres of cover. In the areas of the site with less than 40 metres cover, the development would be restricted to the proposed access road and rail spur.

There are two modes of surface pothole formation. One is upward migration of the roof of the void by progressive collapse, the other is erosion of clay and extremely low strength rock to produce cavities in the soil which substantially collapse.

The following text assesses the potential impact of the Project on mine subsidence in terms of the identified risk areas in Douglas Partners' report contained in Appendix S.

Access Road South of Sawyers Creek (Area 1)

The proposed access road traverses an area undermined by board and pillar workings at a depth ranging from 5 metres to 15 metres. The sub-surface profile revealed by investigations indicate a thickness of about 9 metres to 12 metres of soil and highly weathered rock overlying generally medium strength sandstone, which forms the immediate roof of the coal seam/void/rubble areas. The sandstone ranges in thickness from about 4 metres to 1 metre. Where rod falls (possible open voids) were encountered these ranged in height from about 1 metre to 2.6 metres but were typically about 2 metres thick. The voids are generally associated with rubble thickness from about 1 metre to 6 metres thickness, though typically 3-4 metres. This suggests that the void is already substantially filled with rubble either as a consequence of a small coal left in the works or because of the bulking of fallen material. The total depth of cover over these features ranges from about 11 to 15 metres.

Assuming a bulking factor of about 1:4 a 1 metre high void would choke with rubble prior to reaching a height of 10 metres and a 1.5 metre prior to reaching the height of 15 metres. Given the maximum observed void height observed by Douglas Partners, worst case future pothole subsidence from this mechanism would result in a pothole of up to about 1.6 metres deep.

Access Road North of Sawyers Creek (Area 2)

The access road north of Sawyers Creek traverses an area of board and pillar workings which ranges from 10 metres to greater than 40 metres depth below the surface. In the areas of line drilling undertaken by Douglas Partners, the isopachs predict a depth of cover in the range of 10-20 metres over the top of the seam. It is likely that there was previously an open pothole in the general area which discharges smoke from an underground fire.

The longitudinal surface profile interested from the bores along the centre line of the proposed access road is provided in Drawing 3 in Appendix B of Appendix S. Two supplementary bores were drilled and the traverse profile is shown on Drawing 4 Appendix B. The longitudinal section indicates a depth of about 1-2 metres of clay overlying highly weathered sandstone to a depth ranging from 4-9 metres but typically about 8-9 metres. This is generally underlain by grey, typically medium strength or stronger sandstone which ranges in thickness from about 3 metres to 18 metres. Rod falls indicating possible open voids were generally encountered at the base of the grey sandstone unit at depth ranging from 13-18 metres. The height of the voids ranged from about 1 metre to 1.5 metres. Anomalous conditions were encountered in one bore where a 1.7 metre high void was encountered at a depth of about 8 metres.

Voids in adjacent bores at similar elevations are only observed where the void is still within or near the seam and has not migrated upwards. Where voids have propagated upwards the voids in adjacent bores are at different elevations and in some cases the voids have already been choked off by the bulking of rubble. Given that the maximum of 3 metres of grey (medium strength) sandstone generally overlies the voids the rate of upward migration of the potholes in most cases will be slow and possibly be terminated by the sandstone. If upward migration is not stopped by the sandstone, the height which the bulking of the rock chimney would choke off the void depends on the diameter of the chimney and the height of the void. Choking heights are given in Table 2 of Appendix S. It is expected that any pothole formed by progressive collapse of the rock stratum would not be expected to exceed 2 metres diameter and up to about 2 metres deep.

Wagon Storage Roads

No specific sub-surface investigation was conducted along the storage roads however, given its proximity to Area 2, it is likely that conditions in this area are similar.

Turnout from Main Line (Area 3)

The Mine Plan (RP) indicates limited mining at the northern end of this area in the form of two tunnel headings crossing centrally beneath the section. Line drilling undertaken by Douglas Partners was limited to the northern 20 metres of the area where limited board and pillar mining was undertaken.

The longitudinal section, shown in Drawing 5, Appendix B in Appendix S, indicates a depth of about 1 metre of clay/extremely weathered rock overlying highly weathered sandstone to a depth ranging from 10-11 metres. This is generally underlain by grey, typically medium strength or stronger sandstone which ranges in thickness from about 14-21 metres, but is typically 19-21 metres.

Rod falls indicating possible open voids were generally encountered at the base of the grey sandstone unit at depths ranging from 13-18 metres. Rod fall heights ranging from 1.5 metres to 5.8 metres were observed while drilling but subsequent investigation found that the open void height ranged from 0.9 metres to 1.9 metres and the remainder of the rod fall was loose to rubble. The top of the void ranged from a depth of 23 to 25 metres and was at or below the top of the coal seam. Hence there appears to be no previously upward migration of mine voids in Area 3.

Given the ageing of the workings and the present position of the voids, it is probably that the rock roof in this location is strong enough to preclude progressive roof collapse and chimney formation. If chimneys were to develop in this area they would not be expected to reach the ground surface prior to choking off.

A pair of tunnel headings crosses the Turnout and Main Line in area of shallow cover, as indicated on Drawing 1V, Appendix B of Appendix S. The condition of these tunnels and the roof over these tunnels is unknown. Development practice normally required by the MSB and DPI is for such features to be located and backfilled during construction and hence these were not considered during investigation.

Summary

The geotechnical investigation indicates that progressive roof collapse at the site would either choke off prior to reaching the surface or form small potholes with a maximum diameter of about 2 metres and a maximum depth of about 2 metres but typically less than 1 metre. No surface expression of pothole subsidence from progressive roof collapse would be anticipated in areas exceeding 20 metres cover. There is a risk of significantly larger subsidence potholes forming as a result of internal erosion and piping of clay and erodible weathered rock as a consequence of water inflow into the potholes and chocked off debris chimneys, and is interpreted to be the cause of the large pothole observed in 2009.

It should be noted that the site is not identified in a Mine Subsidence District, and as a result no approval is required from the MSB. However, the *Mine Subsidence Compensation Act 1961* allows the Board to provide advice in relation to areas that are affected by subsidence regardless of whether these areas are contained in a Mine Subsidence District. The MSB has been consulted during the concept design phase of the Project, as discussed in Section 6.

10.4 **MITIGATION MEASURES**

10.4.1 **DANGEROUS GOODS**

- Flammable and combustible storage depots should be located on site in accordance with Australian Standard, AS 1940:2004 *The Storage and Handling of Flammable and Combustible Liquids*.

The diesel tank should be located at least one-sixth of the diameter of the tank or 1 metre, whichever is the greater, from any other flammable or combustible storage depot. The oil should be located at least 1 metre from any other flammable or combustible storage depot. The paint should be located at least 3 metres from any other flammable or combustible storage depot.

10.4.2 **MINE SUBSIDENCE**

Having regard to the ground conditions, including the strong sandstone roof and depth of cover, the measures for protection of the structure proposed for the areas of shallow mining and personnel who will use the development are described below.

General

- Except for the access road and railway embankment, pedestrian and vehicular traffic should be restricted from areas of the site with less than 40 metres cover, unless a specific risk assessment is undertaken for the proposed access.

Area 1, Access Road

- The mine voids beneath Area 1 should be fully grouted and any existing piping within the soils should be eliminated by grouting, by over-excavation and re-compaction or by forced collapse by means of dynamic compaction.
- Grouting and soil improvement works would need to extend at least 5 metres each side of the access road.

Area 2, Access Road

- The use of a continuously reinforced, possibly post-tensioned, concrete pavement designed to span a 5 metres void is recommended for Area 2 where the depth of cover is less than 20 metres.
- Site improvements to minimise piping erosion, together with monitoring of the access road area for the incidence of pothole subsidence, should include the measures described below:-
 - Excavation of the footprint of the Access Road and additional 5 metres each side of the footprint, to the top of very low strength, or better, rock. The anticipated depth of excavation in Area 2 is about 1 metre to 3 metres, based on the logging of the recent non-core bores. The depths would need to be confirmed during construction.
 - Over-excavation of any cracks or rubble chimneys and backfilling with dental concrete to seal the rock surface against soil and water inflow.
 - Placement of about 150mm blinding layer of sand.
 - Placement of a grid of coax cable for the time-domain reflectometry to detect pothole formation at the top of the bedrock. The coax should be covered with a blinding layer of about 150mm of sand.
 - Place heavy duty geotextile filter cloth over the blinding layer prior to placing general filling.
 - Three layers of soil reinforcing geogrids should be included in the lower 450mm to 500mm of general filling above the sand blinding layer.

- If the monitoring detects the onset of pothole subsidence then remedial grouting would be required to grout the rubble chimney/void.

Area 3, Turnout from Main Line

- The abandoned tunnel headings under the central section of the turnout need to be located and backfilled. Depending on the depth of cover this could be undertaken by bulk earthworks or drilling and grouting.
- There is little risk of future potholing over the limited board and pillar workings with less than 20 metres cover at the northern end of the siding. It is however, noted that any pothole subsidence in this area, if it occurred, would cause shutdown of the facility. Hence it is suggested that grouting be undertaken to backfill these workings under and within 5 metres of the footprint of the siding, notwithstanding that future pothole subsidence is considered very unlikely in this area.

Wagon Storage Roads

The wagon storage roads lie close to the access road in the shallow mining area north of Sawyers Creek. Potholes in this area are expected to be less than about 2 metres diameter and 2 metres deep, provided that drainage measures, including lines table drains, sealed pits and adequate surface grades to prevent ponding of water, are in place to control surface run-off and reduce the risk of pothole enlargement by piping erosion. The following works should be undertaken to prepare the wagon storage roads:-

- Excavation of the footprint of the wagon storage roads (where the cover depth is less than 20 metres), and an additional 5 metres each side beyond the footprint, to the top of very low strength, or better, rock; the anticipated depth of excavation is about 1 metre to 3 metres, based on the logging of the recent non-core bores; the depth would need to be confirmed during construction.
- Over excavation of any cracks or rubble chimneys and back-filling with dental concrete to seal the rock surface against soil and water inflow.
- Backfill the excavation up to sub-grade level using the excavated soil and weathered rock, places and compares under engineering control.

10.4.3 **BUSHFIRE**

Strategy 1 – Provision of Defendable Spaces to the Project

Defendable spaces shall be provided around the buildings on site as detailed below:-

- Southwest of the facilities on site - Defendable space of minimum 17 metres to be provided to the southwest of the locomotive wash facility, locomotive maintenance facility, wheel lathe, administration building and provisioning shed.
- South of the Administration facility and wheel lathe facility - Defendable space of minimum width 17 metres to be provided to the south of the wheel lathe and administration building.
- Southeast of the administration facility and wheel lathe facility - Defendable space of minimum width 21 metres to be provided to the southeast of the administration facility and wheel lathe facility.
- Northwest of Provisioning Shed - Defendable space of minimum of width 21 metres to be provided to the northwest of the provisioning shed.

Strategy 2 – Management of Defendable Spaces to the Project

The management of defendable spaces and landscaped areas within the Project shall comply with the following:-

- Maintain a clear area of lawn or pavement adjacent to the buildings.
- Utilise non-flammable materials such as scoria, pebbles and recycled crushed bricks as groundcover to landscaped gardens in close proximity to buildings.
- Keep areas under shrubs and trees raked and clear of combustible fuels.
- Trees and shrubs should be maintained in such a manner that tree canopies are separated by 2 metres and understorey vegetation in not continuous.

Strategy 3 – Construction Standards to Buildings

The following bushfire construction standards shall be applied to the proposed buildings:-

- Buildings shall be constructed to comply with Level 3 construction specifications as defined by Australian Standard AS 3959 – 1999 '*Construction of Buildings in Bushfire Prone Areas*'.
- Access doors (PA and Vehicle) to the buildings shall be fitted with seals that enclose the bottom, stiles and head of the door against the opening/frame, to prevent the entry of embers into the buildings. Particular attention shall be paid to the gap at the head of the curtain of the roller doors, where mohair type seals can be used.
- Any external vents, grilles and ventilation louvers shall have stainless steel mesh with a maximum aperture of 2mm square fitted to prevent the entry of embers into the building or be fitted with a louvre system which can be closed in order to maintain a maximum aperture or gap of no more than 2mm.
- Roof ventilators shall be fitted with stainless steel flymesh (2mm aperture) to prevent the entry of embers into the building or be fitted with a louvre system which can be closed in order to maintain a maximum aperture or gap of more than 2mm.
- The Fuel Storage and Trade/Waste Recycle facilities shall be constructed/managed in order to prevent ignition of fuel and combustible materials by burning embers. Consideration shall be given to the installation of 'wet-down' sprinklers which can be used to douse burning embers and reduce the radiant heat levels on these facilities.

Strategy 4 – Water Supplies for Fire Fighting Operations

The fire fighting water supply to the proposed facility shall comply with the Building Code of Australia (BCA) and Australian Standards A.S. 2419.1 – 2005.

Strategy 5 – Plans of Management

The following Plans of Management shall be prepared:-

- An Evacuation Plan which addresses the protocols necessary to protect the occupants of the Project against the defined emergencies which may impact upon the site, including bushfire.
- A Plan of Management which addresses the likely impact from the identified emergencies, on the assets on the site so as to minimise loss/damage to the infrastructure and movable assets.
- A Bushfire Management Plan which provides the protocols for the management of combustible fuels in the retained Lower Hunter Spotted Gum-Ironbark Forest.

Access for Fire Fighting Operations

The provision of access roads within the facility shall be constructed, as a minimum, to the deemed-to-satisfy provisions of Section 4.1.3(2) of *Planning for Bushfire Protection 2006*.

Sprinkler System to Fuel Storage and Trade Waste Facilities

The Fuel Storage and Trade Waste/Recycle facilities shall be constructed/managed in order to prevent ignition of fuel and combustible materials by burning embers. Consideration shall be given to the installation of ‘wet-down’ sprinklers which can be used to douse burning embers and reduce the radiant heat levels on these facilities.

10.5 CONCLUSION

Hazards and risks were identified by the DGR’s as a key environmental issue for the Project. Results of desktop and field studies indicate that there is a low potential for the Project to impact on hazards and risks. Mitigation measures have been identified, and are discussed above to minimise the potential of the Project to impact on hazards and risks. Detailed geotechnical investigations are currently being undertaken to determine the best strategy to manage mine risk. These would be discussed with the Mine Subsidence Board. Overall, it is considered that the Project is appropriate and would not result in any unacceptable adverse impacts on hazards and risks.

11 HERITAGE

11.1 INTRODUCTION

The Director-General's Requirements identified heritage as a key issue for the Environmental Assessment. This section describes the existing environment and identifies the potential heritage impacts of the Project for both construction and operation. It also identifies mitigation measures that would be required to reduce these impacts. Any residual impacts are also discussed where applicable. The management measures are further detailed in the draft SOC contained in Section 18. **Table 45** below outlines the Director-General's requirements and where they have been addressed in this report.

Table 45 Director-General's Requirements for Heritage

DIRECTOR-GENERAL'S REQUIREMENTS	SECTION ADDRESSED
Indigenous heritage items and places of significance, natural and landscape values of the site and surrounding area, taking into account the <i>Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation</i> (DEC, 2005); and	Sections 11.1.1, 11.2.1, 11.3.1-4 and 11.4.1 Appendix I
Non-Indigenous heritage, including archaeology items and areas of local, state and national heritage significance on the site and within the surrounding area.	Sections 11.2.2, 11.4.5 and 11.4.1 Appendix J

11.1.1 ASSESSMENT APPROACH

SKM have undertaken an Aboriginal Cultural Heritage Assessment Report (February, 2010) for the Project. Consultation was undertaken in accordance with the *Draft Community Consultation Requirements for Proponents, for Aboriginal Cultural Heritage (Requirements)* (DECCW 2005).

This included stakeholder registration, opportunity for stakeholder to comment on the assessment and sub-surface testing methodology, participation in field work and an opportunity to comment on the Draft report. Additionally, two Aboriginal Focus Group Meetings were held.

In addition to consultation, a desktop study was undertaken for the Project, as well as field surveys to complement and test the findings of the desktop assessment. For a detailed description of the methodology used to undertake the Aboriginal Cultural Heritage Assessment Report see Appendix I.

SKM have also undertaken a Historical Heritage Assessment (February, 2010), a copy of which is contained in Appendix J. The Historical Heritage Assessment provides a legislative review and historical background, as well as detailing the results of field surveys and sub-surface testing. A significance assessment was also undertaken, and where appropriate mitigation measures have been recommended. For a detailed description of the methodology used to undertake the Historical Heritage Assessment Report see Appendix J.

Additional field work was undertaken by Maxim Archaeology in July in response to preliminary concerns raised by the DOP regarding a row of Miner's cottages located on the site adjacent to the Main Northern Railway. A copy of this study is attached as an addendum to Appendix J. A detailed description of the survey and reporting methodology is contained in Section 1.3 and 2.6 of the addendum report.

11.2 **DESCRIPTION OF EXISTING ENVIRONMENT**

As discussed above, an assessment of Indigenous and Non-Indigenous heritage has been undertaken for the Project, as detailed below.

11.2.1 **INDIGENOUS HERITAGE**

The study area was traditionally occupied by the *Wonnarua* (also spelt Wanaruah), who occupied the lands from just above Maitland South to Wollombi and west through to the Dividing Range.

A search of the Aboriginal Heritage Information Management System (AHIMS) database revealed 40 Aboriginal cultural heritage sites within approximately five kilometres of the Greta site.

The majority (42%) of these stone artefacts scatters with 25% comprising isolated fines, 25% PADs, and one grinding groove site. Ten of these 12 sites are within 100 metres of water, while the remaining two are within 300 metres of the water course. Based on the search of the AHIMS database and the review of previous cultural heritage investigations completed within the Region, the following predictive model was developed:-

- The most common site type is artefact scatters/open camp sites followed by isolated finds.
- Sites will be most commonly associated with the water source and adjacent elevated land forms such as creek banks, specifically Sawyers Creek to the south of the study area or northern tributaries of Anvil Creek.
- Surface scanners are more likely to be identified in eroding landscapes due to high levels of ground surface exposure.
- Stone artefacts are likely to be found in sub-surface context in PADs meaning that survey may not identify the extent of Aboriginal cultural heritage values in the study area.
- Other sites which may occur include axe grinding grooves, however, the likelihood of these sites occurring in the study area are low.

A field survey was undertaken which located 151 flaked stone artefacts as well as two Potential Archaeological Deposits (PADs). 130 artefacts were located within or around the area of PAD 1 and 21 artefacts were located in PAD 2. All artefacts were found in areas of higher ground surface visibility, and mostly in areas that had been eroded or disturbed, so are likely to have originated from a near surface or sub-surface context. These are plotted in Figure 39 and Figure 40 on the following page, and detailed within Appendix D of the Aboriginal Cultural Heritage Assessment report (SKM, 2010) contained in Appendix I.

Based on the results of the field survey, it was considered that there is a high likelihood of buried sub-surface deposit existing within the PADs and at least some areas existing where these deposits are intact. Further, it was considered that there is the potential for these deposits to increase knowledge of Aboriginal occupation of this area. Accordingly, sub-surface testing was undertaken.

A total of 125 test-excavations were undertaken as part of the sub-surface testing. A total of 90 new artefacts were recorded, eight within PAD 1 and 82 within PAD 2. These artefacts form, with the results of the field survey, two discrete areas of past Aboriginal activity or archaeological cultural heritage sites (being Sawyers Creek Artefacts Scatter 1 and Sawyers Creek Artefact Scatter 2).

These sites are in the vicinities of PAD 1 (Sawyers Creek Artefact Scatter 1) and PAD 2 (Sawyers Creek Artefact Scatter 1) and are discussed below.

No cultural material was located near the ephemeral drainage lines in the north of the study area, the reasons for this may be twofold. Firstly, the study area is quite thin in the north, so there is less chance cultural material will occur here. Secondly, it may reflect concentration on reliable, permanent water sources, such as Sawyers Creek.

Sawyers Creek Artefact Scatter 1 (AHIMS#37-6-2165)

Site Location - The site is located on the southern side of Sawyers Creek on a flat, raised, alluvial terrace landform, including the sloped sides of the terrace, but not the floodplain below (see Figure 39 below). The site covers an area of approximately 223 metres (N-S) x 100 m (E-W), though its shape is not uniform, additionally, the PAD feature of this site likely continues outside the study area to the west, though this was not able to be verified due to access restrictions.

Site Contents -This site consists of 130 flaked stone artefacts discovered during the field survey (see Figure 3 and Figure 4 in Appendix I), and eight artefacts uncovered during sub-surface testing. The artefacts recorded during field survey lie in eroding, and disturbed areas, consequently it is likely that this site was originally completely sub-surface. No areas of *in situ* deposit were discovered. Potential archaeological deposits to the north west of the area investigated during sub-surface testing are likely to be much more intact and have potential to contain large quantities of stone artefact material; this PAD is likely to extend further west (outside of the study area) along Sawyers Creek (see Figure 39 for estimated extent of PAD).

Artefact Density - The area of the site that currently has the densest recording of artefacts is along the previously excavated trench, where artefacts were found in densities up to 25 artefacts per m². However, this density may not be reflective of the true density as artefacts may have been washed into natural traps into concentrations, or may have been similarly dispersed. Within the area subject to sub-surface testing, the highest artefact density encountered was four artefacts in 0.25 m², which extrapolates to 16/m².

It is likely that within this site, artefact concentrations occur in discrete locations and a sparse background scatter of artefacts occurs between concentrations.

Artefact Descriptions - The stone artefacts within this site are all flaked, and have been fashioned almost entirely from mudstone and silcrete, with one crystal quartz flake. Currently, no detailed description or analysis of the artefacts has taken place, except for those recovered during sub-surface testing (see Appendix D of Appendix I). Artefacts identified during survey were too numerous to analyse in the field, and were not collected, as not all were within the proposed impact zone, and at that stage, the design was still being finalised in order to minimise disturbance to any cultural material. Currently, there is not a sufficient sample size to undertake any analysis of these stone artefacts beyond pure description.

Previous Disturbance - The proposed impact zone is highly disturbed due to previous land-use activities, including a large graded area, mine subsidence from underground coal mining, excavation of trench, movement of heavy vehicles and dumping and picking up of fill materials. The area investigated through sub-surface testing showed many signs of prior disturbance on and below the ground surface. Figure 39 shows the boundaries of the area estimated to have been significantly disturbed. The majority of this area is likely to have had all *in situ* deposits destroyed, though the fringes of the disturbed area are likely only disturbed to a shallower depth (~10cm – 20cm).

Sawyers Creek Artefact Scatter 2 (AHIMS#37-6-216)

Site Location - The site is located on the northern side of Sawyers Creek on the high bank and lower and middle slopes of the rolling hill/undulating plain landform that extends north of Sawyers Creek. The site covers an area of approximately 312 m (E-W) x 150 m (N-S, perpendicular to Sawyers Creek).

The site follows Sawyers Creek, with the PAD features extending to 150 metres from the creek. Additionally, the PAD feature of this site likely continues outside the study area to the west and possibly to the east (on the other [eastern] side of the railway line), though this was not able to be verified due to access restrictions.

Site Contents - This site consists of 20 flaked stone artefacts discovered during the field survey and 82 artefacts uncovered during sub-surface testing.

The artefacts recorded during field survey were discovered in disturbed areas (e.g. graded trotting track, eroding dam walls), consequently it is likely that this site was originally completely sub-surface. One area where deposit appears to be mostly *in situ* occurs on the banks of Sawyers Creek, within a cluster of trees up to ~7 metres from the creek bank. One isolated outlier was located on the edge of an eroding dam. Potential archaeological deposits exist outside the area subject to sub-surface testing, to the east and west, which will not be disturbed by Greta Train Support Facility, and are likely to retain similar deposits to those encountered during sub-surface testing. If intact deposits exist on the eastern side of the railway, between the railway and Anvil Creek, they are likely to be of much higher significance and density.

Artefact Density - This site has several discrete concentrations with sparse ($<1/\text{m}^2$) background scatter of artefacts in between. The densest artefact concentrations were discovered in two locations, both yielding 26 artefacts from 0.25 m^2 , which extrapolates to $104 \text{ artefacts/m}^2$.

Artefact Descriptions - The stone artefacts within this site are all flaked, and have been fashioned predominantly from silcrete (76% of assemblage), with a quarter (24%) of the assemblage of mudstone and one flake of an unidentified medium to coarse-grained volcanic material identified during the survey. Currently, only detailed description and analysis has been undertaken of the artefacts recovered during sub-surface testing (see Figure 38). Further detail on this portion of the stone artefact assemblage is given in Appendix D of Appendix I. Artefacts identified during survey were too numerous to analyse in the field, and were not collected, as not all were within the proposed impact zone, and at that stage, the design was still being finalised in order to minimise disturbance to any cultural material.

Previous Disturbance - The whole of the site is moderately disturbed except for a concentration on the bank of Sawyers Creek which lies within a cluster of trees up to ~7 metres from the creek bank. A graded trotting track cuts through the north of the site, and one dam and an eroding dirt track lie in the south. Slope wash is eroding parts of the site surrounding more significant disturbance, such as fill introduction, excavation, tracks, etc, due to the lack of vegetation. The locations of sub-surface testing and archaeological finds are detailed in the following figures.

Figure 38 Locations of sub-surface testing and archaeological finds

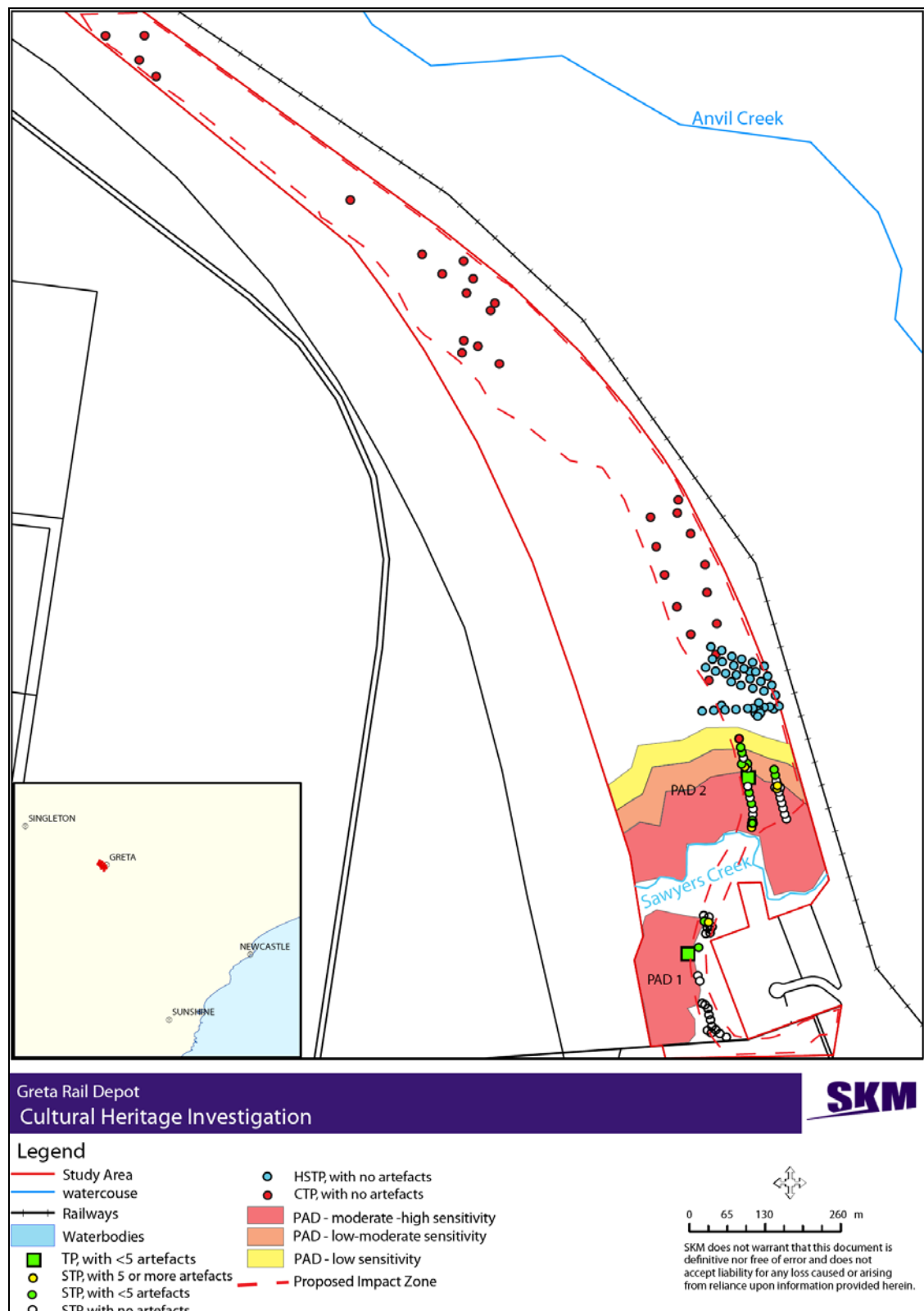


Figure 39 Plan of Sawyers Creek Artefact Scatter 1, showing locations of artefacts and PAD
(Source: SKM, 2010)

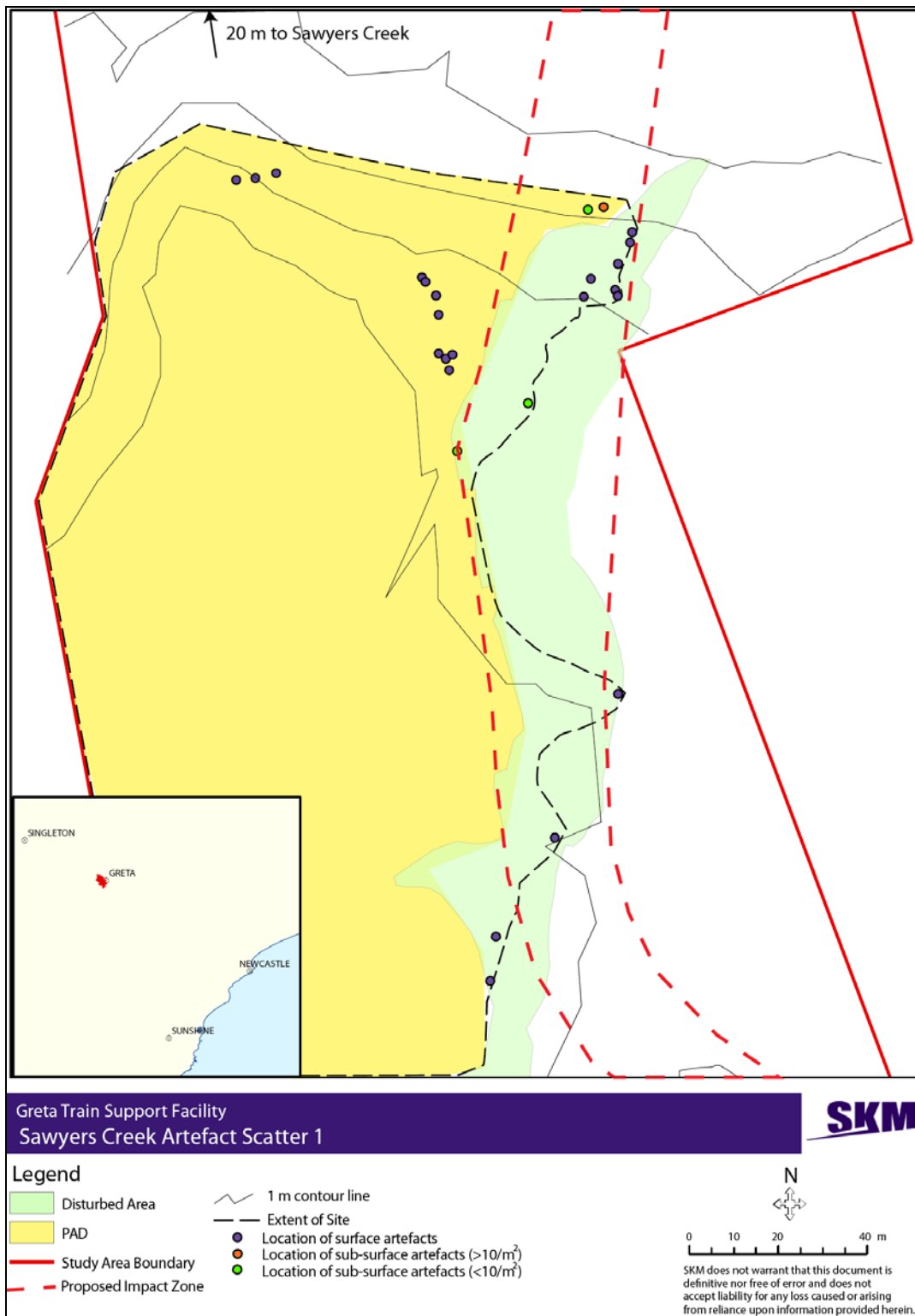
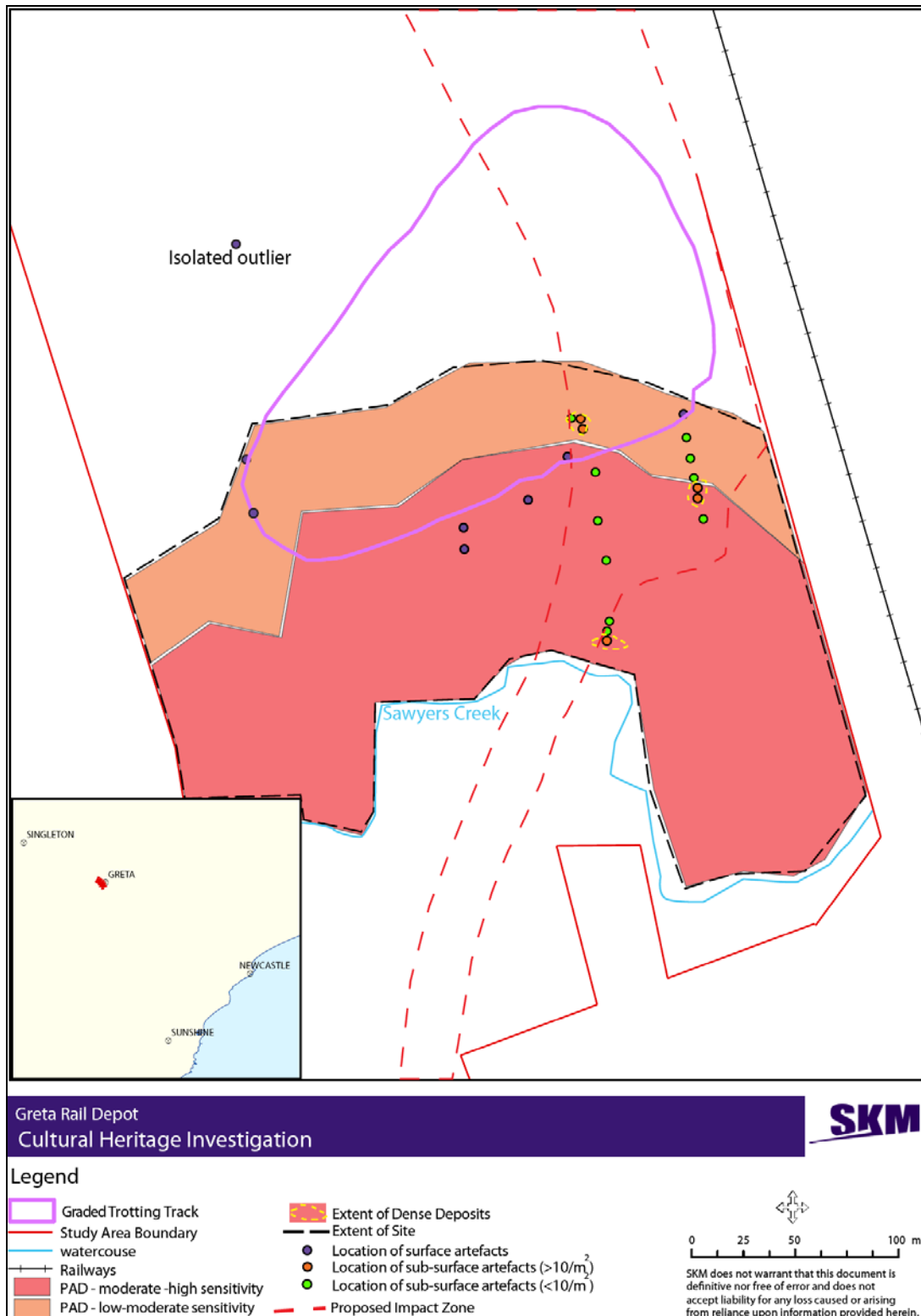


Figure 40 Plan of Sawyers Creek Artefact Scatter 2, showing locations of artefacts and PAD



11.2.2 **NON-INDIGENOUS HERITAGE**

SKM prepared a Historical Heritage Assessment for the Project to determine the past European uses of the site and the likely heritage values within the region. The two themes identified as being significant to the area in relation to European heritage are coal mining and the railway.

A detailed account of the chronology of coal mining in the Greta Area is provided in Table 4-1 in Appendix J. This table shows that the Greta, Anvil Creek area has a strong coal mining history going back to William Farthing's first attempts to mine coal there in the early 1860s. Various coal mines have operated in this area including Anvil Creek, New Anvil Creek, Greta, Leconfield, Ebbw-main, Whitburn, Central Greta (Old Anvil Creek re-opened as Central Greta on 25 April 1908), Broxburn, New Greta and Whitburn.

Coal mining operations have been the catalyst for the development of urban settlements at Anvil Creek and Greta with town growth and prosperity linked greatly to the market fortunes of the coal mining industry. The major period for operation of the Greta area coal mines was in 1913 when the three operational mines employed nearly 500 people. It was the combined output from the Greta mines which led to duplication of the Great Northern Railway from West Maitland to Greta.

Mine workings underlain the site and a map from 1873 (see Figure 3-2 in Appendix J) shows numerous miners houses running in a line parallel with the rail line. Evidence also suggests that there were German miner's huts within the study area. It is possible that informal, small-scale mining or mining related activities occurred within the site associated with these residences, or not.

The Great Northern Railway was constructed through Greta during the 1860s with the eight mile Lochinvar to Branxton section being opened to traffic on 24 March 1862.

The remnants of past mining activities on the site includes excavators shallow shafts, some of which have been lined with dry placed stones, elongated shallow trough features, stone and soil detritus from digging, small piles of coal and chitter and scattered bricks. These remains will be assessed for historical importance as part of the environmental assessment.

In relation to items in the local area which have been listed as having heritage significance, none are located on the subject land. However, the following items are located in the vicinity of the site.

State Heritage Items

The State Heritage Register is maintained by the Heritage Branch (Department of Planning, NSW). A search of the State Heritage Register (SHR) returned one item listed within 1km of the project area.

The Greta Railway Station Group (SHR 01156), is located adjacent to, but not within the project area. The Greta Railway Station located on the Main North Line was first opened with the name of Farthing in 1869 and renamed Greta in 1878. The Greta railway Station Group represents historic themes consistent with the development of Greta and surrounds and the rail and mining industries in the Hunter region. The Statement of significance for this site states:-

Greta station group is perhaps the best late 19th century station group surviving from the period before the introduction of standard and economical construction methods around 1890. Its significance is enhanced by its intactness and completeness. The station building and residence...are particularly fine buildings and the residence appears to be of unique design. The station building is the only surviving example of its kind without significant alteration. The site exhibits layering of different periods and styles, largely due to duplication and the need for additional buildings at that time. As new buildings were constructed at each stage and buildings were not extended (with the exception of the awning on the signal box) it displays a range of unaltered structures from various periods co-existing at one location. The footbridge, signs, lights, fencing and other details of the site add to the significance and completeness of the site and help create what is a unique small country railway station group. (NSW State Heritage Register).

Local and Regional Heritage Items

Hunter Regional Environmental Plan (REP) 1989 (Heritage)

Within 1km of the area of proposed works the Hunter REP 1989 lists three items of regional environmental heritage (Schedule 2), three items of local environmental heritage (Schedule 3) and 10 items requiring further investigation (Schedule 4).

All of these items are summarised in **Table 46**. Of the 10 sites requiring further investigation, four sites are located in or adjacent to the project area.

Whitburn Colliery - The Whitburn Colliery (formerly the North Greta Colliery) began operations in 1902 and closed in 1948. The pit-top was on the eastern side of Anvil Creek, between the creek and Greta Township with entry tunnels running in a north westerly direction. It therefore is situated adjacent to but outside the project area.

Water Storage Tanks - This refers to the concrete remnants of overflow walls from the Whitburn Colliery dam in Anvil Creek and is located outside the project area.

Anvil Creek Colliery - The Anvil Creek Colliery was also situated north of the Railway station on the eastern side (see Figure 4-1 in Appendix J) and is outside the project area.

Street of “Miners Cottages” - Part of a street of “Miners Cottages” identified in Figure 4-1 of Appendix J extends within the project area and also outside the project area to the north east.

Items required further investigation identified in Schedule 4 of the Hunter REP 1989 (Heritage) are afforded some protection in that they cannot be demolished without the consent of the local council. In addition the council shall not give consent to a development to an item in Schedule 4 unless an assessment has been made of its condition and significance

Cessnock Local Environmental Plan 1989

Schedule 3 of the Cessnock LEP revealed no items of environmental heritage within 1km of the project area.

Draft Cessnock Local Environmental Plan 2009

Schedule 5 of the Draft Cessnock LEP, lists the collieries of the South Maitland Coal Field/Greta Coal Measures Group as an item of local significance. Of this group, the Old Anvil Creek Colliery is adjacent to and situated outside the site beyond the rail corridor boundary to the east.

Part of the Great Northern Railway Network forms the eastern boundary of the study area and is listed as having State significance, however, this item is not listed on the State Heritage Register, and as a result the significance is yet to be determined. It is unlikely that this item would be impacted by the Project.

National Heritage List and Commonwealth Heritage List

The NHL and CHL comprise a framework for the listing and protection of natural and cultural heritage places across Australia. These registers were searched in relation to the project area, and no heritage items were found within 1km of the project area.

Register of the National Estate

Before the introduction of the NHL and CHL, the RNE was the Australian Government's nation-wide heritage list. This list still exists as a comprehensive register of heritage places around the country. One item was listed on the RNE within 1km of the project area. This is summarised in Table 46 below.

National Trust Register

The Greta Railway Station Precinct is listed on the NSW National Trust's Historic Items Conservation Register. The National Trust listing offers no statutory protection, but it does offer a widely recognised authoritative statement of the cultural significance of an item or place, and reinforces the State significance of the station precinct.

Summary of Heritage Items

One registered heritage item is located within the project area (the street of "Miners Cottages"), and an additional 21 items are located within 1km of the project area. The following table details a summary of all heritage items located within 1km of the Project.

Table 46 Summary of Heritage Items within 1km of the Subject Site (Source: SKM, 2010)

HERITAGE PLACE	HERITAGE REGISTER AND ID	LEVEL OF SIGNIFICANCE	DISTANCE FROM PROPOSED WORKS
Greta Railway Station Group, including Station and Station Masters House, Off Nelson St, Greta	National Trust State Heritage Register (NSW) SHR (01156) Draft Cessnock LEP 2009 (I114)	State State Local	Approx 200m
Great Northern Railway Network	Draft Cessnock LEP 2009 (I251)	State	Borders eastern and northern extent of project area
Police Station, Lock up and Residence, 1 Water St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I115)	Regional Local	Approx 750m
Median Strip Group including War Memorial and Bandstand, High St between Water and Wyndham Sts, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I111)	Regional Local	Approx 800m
Greta Courthouse (former)	Register of the National Estate (1219) Hunter REP 1989 Draft Cessnock LEP 2009 (I108)	Local Local Local	Approx 700m
Greta Public School, Wyndham St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I116)	Local Local	Approx 600m
Masonic Hall (former) 67 High St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I103)	Local Local	Approx 800m
Methodist Church, High St, Greta	Hunter REP 1989	Local	Approx 900m

HERITAGE PLACE	HERITAGE REGISTER AND ID	LEVEL OF SIGNIFICANCE	DISTANCE FROM PROPOSED WORKS
St Marys Anglican Church, Anvil St, Greta	Draft Cessnock LEP 2009 (I99)	Local	Approx 900m
Greta Uniting Church, 43 High St, Greta	Draft Cessnock LEP 2009 (I102)	Local	Approx 900m
Inn (former), 72 High St, Greta	Draft Cessnock LEP 2009 (I104)	Local	Approx 800m
Tattersalls / Greta Hotel, 88 High St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I105)	Requires further investigation Local	Approx 700m
Greta Post Office (former), 94 High St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I106)	Requires further investigation Local	Approx 700m
Greta Council Chambers (former), 96 High St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I107)	Requires further investigation Local	Approx 700m
Two storey shop, 110 High St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I109)	Requires further investigation Local	Approx 700m
Horse Trough, within road reserve, Greta	Draft Cessnock LEP 2009 (I110)	Local	Approx 800m
Sandstone kerbs, gutters, drains and dam in High, Anvil, Wyndham, Bell, Chapman and Waters Streets and New England Highway, Greta	Draft Cessnock LEP 2009 (I112)	Local	Approx 700m
Greta Bridges Group,	Draft Cessnock LEP 2009 (I248)	Local	Nelson Rd (approx 300m)
Anvil Creek Colliery	Hunter REP 1989	Requires further investigation	Approx 300m
Water Storage Tanks	Hunter REP 1989	Requires further investigation	Approx 300m
Street of "Miners Cottages"	Hunter REP 1989	Requires further investigation*	In project area

* Note Maxim Archaeology completed additional fieldwork to investigate the significance of these structures as detailed in Section 11.3.2 below.

Site Inspection

A site inspection was undertaken on 28 September 2009. Numerous unfrosted (possibly hand-made) bricks were found scattered across parts of the study area, as well as the rock-lined 'shafts', discussed in Section 12. Additional historic artefacts were discovered scattered in parts of the southern half of the site including glass and ceramic fragments, as well as what is thought to be a brass or bronze belt buckle. These artefacts were not concentrated and did not appear to be associated with any particular feature.

Sub-surface Testing

The sub-surface archaeological investigation comprised a survey by gridded transects of the area with 25cm shovel test pits (STP) at 20 metre intervals. Those STP containing cultural material were further tested by four radial STP at 10 metre intervals. Five transects were completed within the site comprising 38 excavated STP (not including radials to the north of the Indigenous PAD area). A total of 87 artefacts were located on site including a small bronze cow bell. The balance of artefacts recovered included ceramics, glass and metal from domestic, architectural and agricultural classes. The breakdown of these artefacts is detailed in the following table.

Table 47 Artefacts Recovered During Sub-surface Testing by Class (SKM, February 2009).

CLASSES	WEIGHT (G)	COUNT
Agricultural	268	1
Architectural	8	5
Clothing	1	2
Domestic	675	80
Total	952	87

Feature Excavations

Feature excavations were also undertaken on site. Three shaft or pit features were excavated as a representative sample. In the southern section of the site, several fragments of gauged hardwood, lengths of iron, a brick and some bottles (of various conditions) were located in these excavations.

The northern most feature excavated displayed evidence of previous farming activity including fencing wire together with bottles, plastic and other discarded domestic items in a relatively shallow depression that marked the features and perhaps provide an indication of previous use. Once excavated, the wall profile revealed shards of whiteware, glass and an iron ring/pipe. Two other features were excavated which did not locate any additional artefacts although several large sandstone blocks were present in the fill material in one feature.

The locations of sub-surface testing and feature excavations are detailed in the following figures.

Figure 41 Detail of approximate location of the 'Miners Cottages' sites showing distribution of STP with artefacts (red) and artefact distribution recovered from Indigenous STP (green) (Source: SKM, 2010).

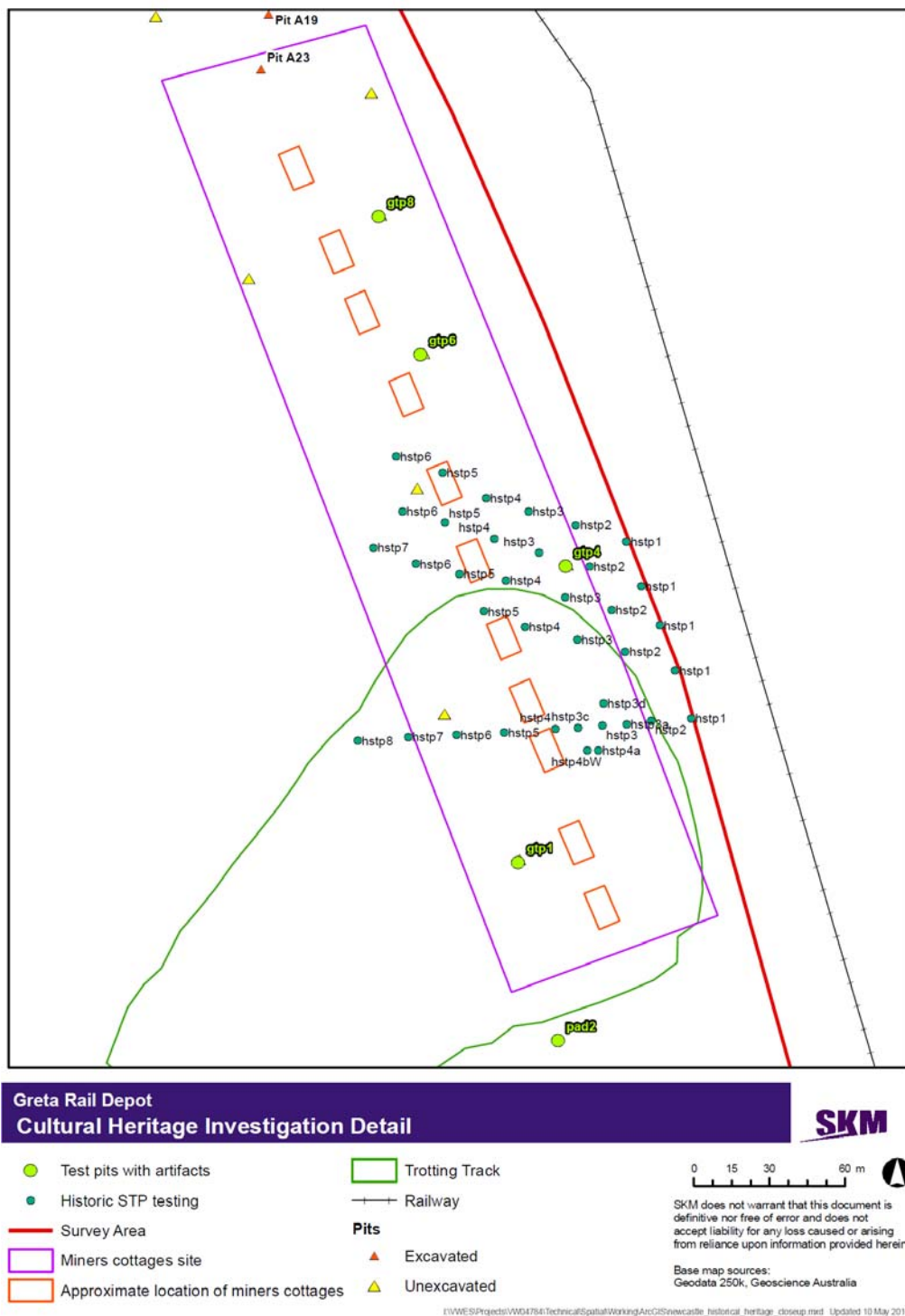


Figure 42 Locations of Sub-Surface Testing and Feature Excavations (SKM, February 2009).

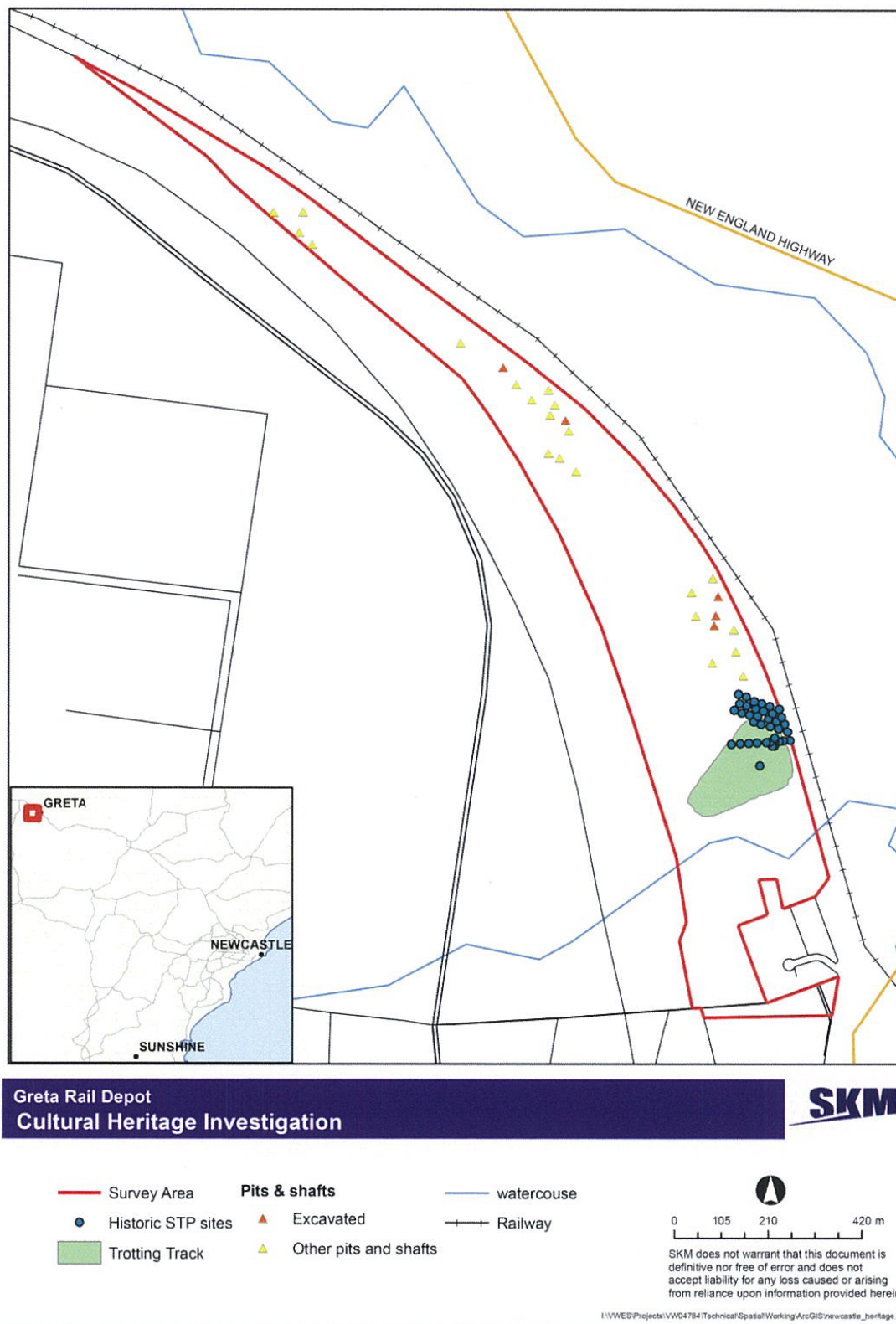
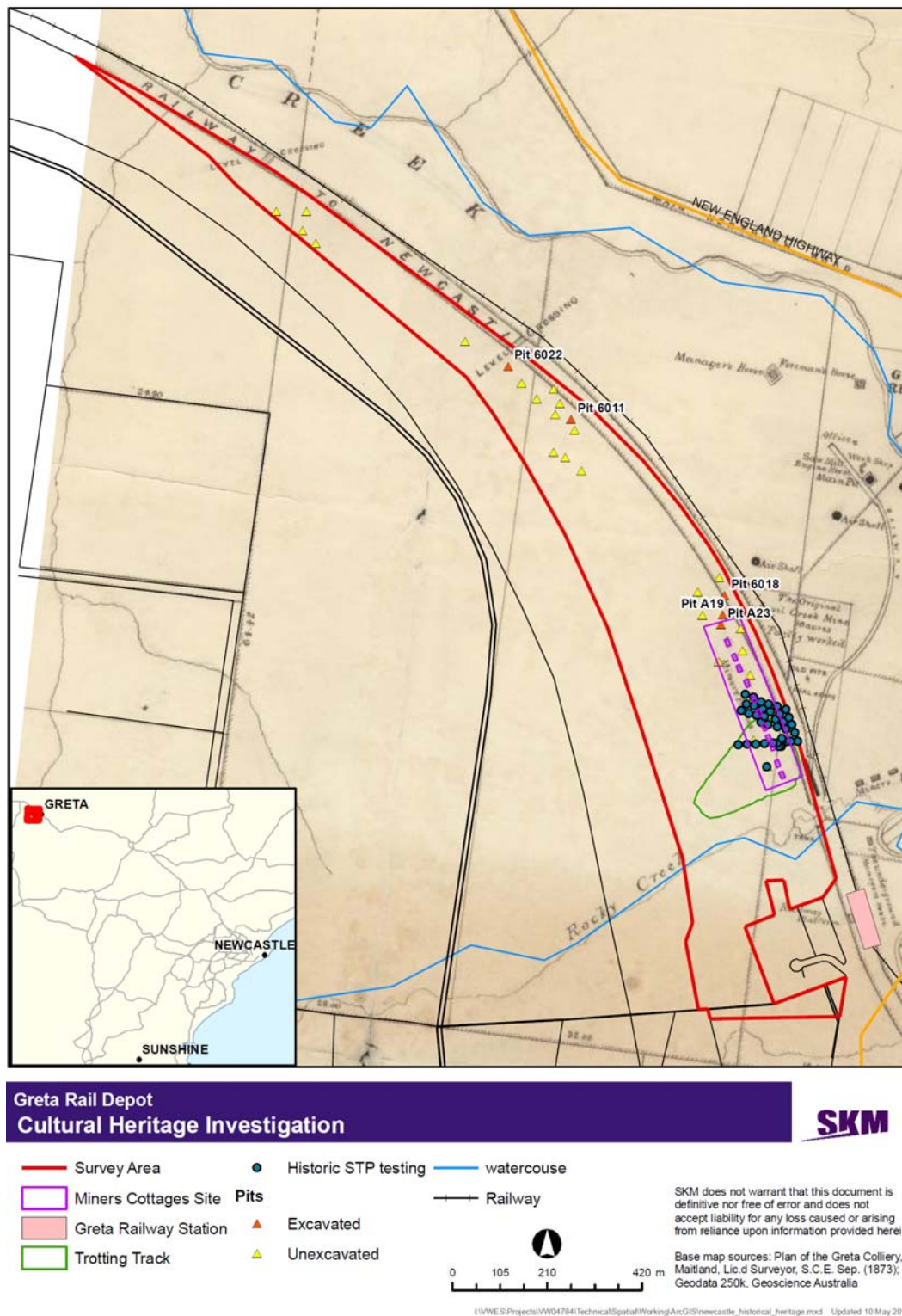


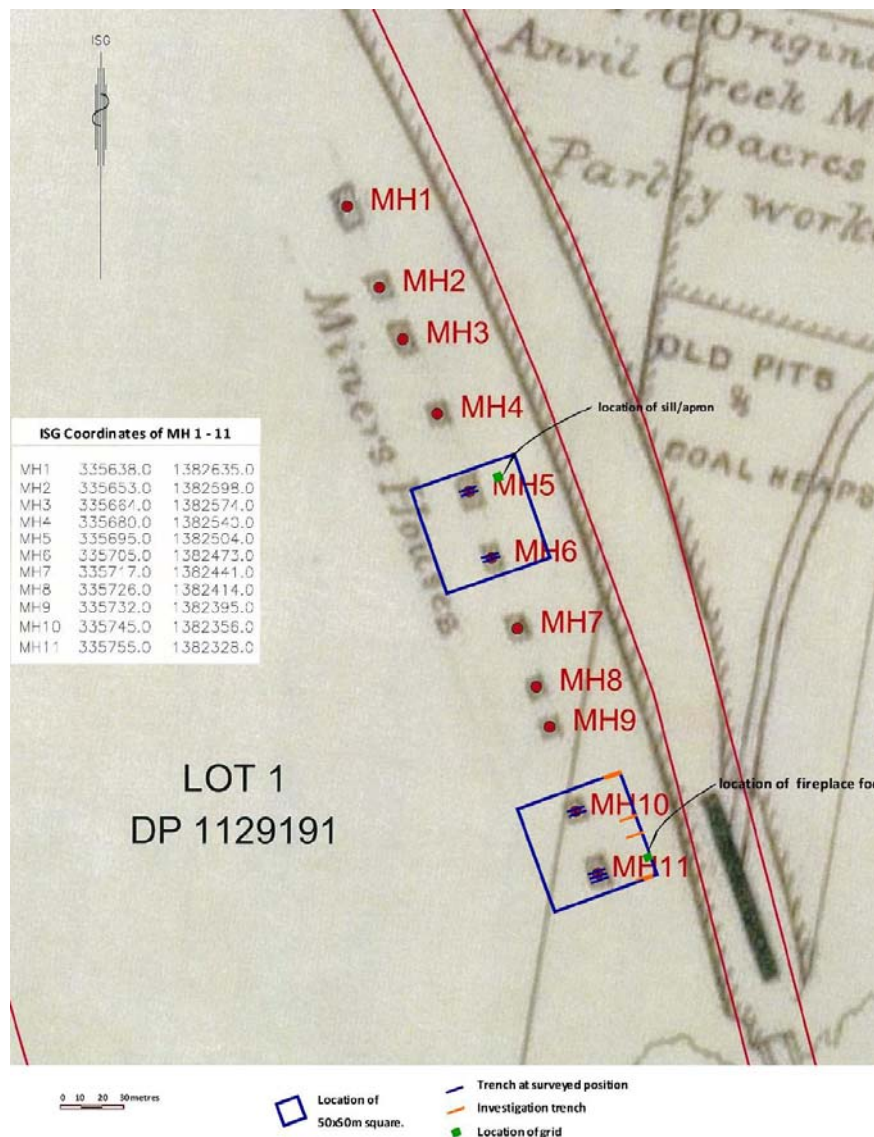
Figure 43 Locations of sub-surface testing and feature excavations



Additional Field Work

As discussed above, Additional field work was undertaken by Maxim Archaeology in July in response to preliminary concerns raised by the DOP regarding a row of Miner's cottages located on the site adjacent to the Main Northern Railway. A copy of this study is attached as an addendum to Appendix J. The survey and reporting methodology is contained in detail Section 1.3 and 2.6 of the addendum report. The survey methodology involved mechanical stripping of the top soil followed by manual excavation. The results of this additional fieldwork are provided below in Section 11.3.2. The location of the additional fieldwork testing is provided in the following figure.

Figure 44 Location of Additional Testing



11.3 ASSESSMENT OF POTENTIAL IMPACTS

11.3.1 INDIGENOUS HERITAGE

Construction of the Project would result in impacts to Indigenous heritage sites, as detailed below.

Significance Assessment

Aboriginal site significance assessments need to consider both the scientific and social or cultural values of a site. Research potential or scientific significance of an indigenous archaeological site can be assessed by utilising the criteria set out below. Social or cultural values of a site can only be established through Aboriginal consultation.

Categories used for assessing scientific significance for Aboriginal archaeological sites are described below. Ratings are low, moderate or high.

Site Integrity – The integrity of a site refers to its state of preservation, or condition. A site can be disturbed through a number of factors among which are; natural erosional processes, destructive land use practices or repeated use of a site in the past by both humans and animals.

Site Structure – Structure refers to a site's physical dimensions, that is, size and stratification, or sub-surface deposits. A large site or a site with stratified deposits has more research potential than small sites and/or surface scatters. Sometimes however, specific research questions may be aimed at smaller sites in which case they would be rated at a higher significance than normal. Site structure cannot be assessed for scarred trees or isolated artefacts.

Site Contents – This category refers to the range and type of occupation debris found in a site. Generally, complex art sites, extensive quarries with associated debris and surface sites that contain a large and varied amount of organic and non organic materials are considered to have greater research potential than those sites with small, uniform artefacts, single motif art sites and small quarries with little or no debris. With scarred trees contents may refer to the size and type of scar or how many there are on the one tree.

Representativeness – Representativeness refers to how often a particular site type occurs in an area and requires some knowledge of the background archaeology of the area or region in which a study is being undertaken. Generally, if a site is rare or unique in some way then it is highly significant, although in one sense all archaeological sites are unique features in the landscape and should be preserved. In areas where little archaeological research has been undertaken or where widespread disturbance of the landscape has occurred any new site is likely to be considered significant.

The significance of a site does not relate only to its scientific or research value. Aboriginal people's views on the significance of archaeological sites are usually related to traditional, cultural and educational values, although most Aboriginal people also value any scientific information a site may be able to provide.

Aboriginal significance was assessed from consultation with the registered stakeholders in AFG meetings, by phone or in writing, and from consultation with stakeholder representatives during field assessment. It should be noted that Aboriginal significance may not reflect the views of every single member of the community.

Discussions with Aboriginal stakeholders has revealed a strong attachment to the area and identified that nearly all archaeological sites are highly significant as reminders of the Aboriginal presence and connection to the land. Scott Franks (Yarrawalk Aboriginal Corporation) stated that he considered the sites to be of high sensitivity to Aboriginal people in general and specifically to the Wonnarua people. Franks stated that he was concerned that the site was part of the little Wonnarua land left in the Hunter Valley that was relatively undisturbed/developed. Rhonda Ward (Ungooroo Cultural and Community Services) and Margaret Matthews (Aboriginal Native Title Services) stated that both sites discovered were very important and of high significance to Wonnarua people. Despite several efforts made by the author to obtain further information from the other Aboriginal stakeholders regarding cultural significance following completion of the assessment, no further inputs were received. Responses were hindered by illness and absence of key representatives of the remaining stakeholders, i.e. MLALC and Lower Hunter Wonnarua Council Incorporated.

The following table details the significance assessment for the sites and places recorded as part of the Aboriginal Cultural Heritage Assessment Report.

Table 48 Significant Assessment for Sites and Places Recorded

SITE NAME (AHIMS SITE NO)	SITE TYPE	INTEGRITY	STRUCTURE	CONTENTS	REPRESENTATION	OVERALL SCIENTIFIC SIGNIFICANCE	ABORIGINAL SIGNIFICANCE
Sawyers Creek Artefact Scatter 1 (37-6- 2165)	Archaeological Site – Isolated Artefact	Moderate – Site has been significantly disturbed in parts by previous land-use – e.g. grading, etc., as well as natural erosion exacerbated by vegetation clearing; though does retain significant areas where deposits are likely to be mostly intact	Moderate – Site has potential to contain intact stratified deposits up to ~ 60 cm in depth, though more disturbed	Low-Moderate – Artefact density not high and raw materials and artefact types are common within the region, however, has the potential to contain sub-surface features, such as hearths in more intact PAD deposits	Low – Artefact scatters of this size are common to the local area and region, and PAD occurs elsewhere along Sawyers Creek, Anvil Creek, and other waterways in the local area	Low-Moderate	High
Sawyers Creek Artefact Scatter 2 (37-6- 2164)	Archaeological site –Sub- surface archaeological deposit and potential archaeological deposit	Low-moderate – Site shows signs of disturbance throughout, e.g. mixed deposits and erosion, except for small area within 7m of Sawyers Creek under stand of trees – this area has some research potential to explore the nature of occupation in this generally poorly investigated region; western edge of this PAD may also be more intact	Low-Moderate – Site extent is not particularly small, but depth of deposit is quite shallow, except close to Sawyers Creek	Moderate – Raw materials and artefact types are common within the region, however, has some potential to contain sub-surface features, such as hearths close to bank of Sawyers Creek with denser deposits	Low - Artefact scatters of this size are common to the local area and region, and PAD occurs elsewhere along Sawyers Creek, Anvil Creek, and other waterways in the local area	Low-Moderate	High

Sawyers Creek Artefact Scatter 1

Only the access road to the Greta Train Support Facility will impact upon Sawyers Creek Artefact Scatter 1. This road was previously aligned along the western boundary of the study area, hence traversing predominantly previously undisturbed areas of this site. Additionally, several buildings were initially proposed to be located on the north-eastern edge of Sawyers Creek Artefact Scatter 1. However, Pacific National was able to realign this road to avoid much of the undisturbed areas of the site and relocate the buildings into the north of the study area away from Aboriginal cultural heritage sites. The road will be aligned within the previously disturbed graded area.

The majority of this site will not be disturbed by the Greta Train Support Facility, and the areas that will be impacted have suffered degradation from prior land use and erosion. The more intact parts of this site have been avoided by Pacific National's realignment of their access track. Although this site has been given a low-moderate overall scientific significance, the areas that will be impacted by the construction of the Project have been previously disturbed and have low archaeological (scientific) significance and have lower cultural significance to the Aboriginal stakeholders.

Sawyers Creek Artefact Scatter 2

The main disturbance proposed in the area of Sawyers Creek Artefact Scatter 2 will result from construction of the access road, and rail track. The road has been realigned to avoid some of the less disturbed PAD part of this site in the west of the study area.

Proportions of this site have avoided being impacted by the Greta Train Support Facility, due to design changes, such as moving buildings and realignments of infrastructure. However, one small area of intact, moderately dense deposit and two other areas of disturbed, moderately dense deposit will be impacted by the access road and one section of rail track. Although this site has been given a low-moderate overall scientific significance, the several areas of denser archaeological deposit that will be impacted by the construction of the Project are of moderate archaeological (scientific) significance and have some research potential. Consequently, salvage of these locations has been recommended.

11.3.2 NON-INDIGENOUS HERITAGE

Construction of the Project is not likely to result in significant impacts to Non-Indigenous heritage sites, as detailed below.

Shovel Test Pit and Features Excavations

The archaeological evidence tends to indicate opportunistic use rather than long term occupational use of the trotting track area. The scatter of artefacts located during testing and excavation do not provide sufficient archaeological evidence to demonstrate occupation of the site especially since no substantial structural evidence such as brick footings, chimney falls or post moulds were found. The small fragments of architectural items recovered from STP in association with domestic artefacts and their shallow depth (0-10cm) effectively point to casual discard and subsequently scattered by agricultural activity. Artefacts recovered from sub-surface testing extending to the north of this area were confined to considerably deeper deposits within two sample features.

The manufacturing dates for the principal periods of ceramics and glass recovered from STP show a trend in deposition toward the mid to late 1800s at a depth of 0-10cm.

It should be pointed out that although geotechnical investigations have identified numerous underground mine tunnel and workings beneath the project area originating from the Old Anvil Creek Colliery (1861 -1864), these appear to have had little archaeological impact or link with surface features in the project area.

The results of archaeological testing and excavation of the project area demonstrate the presence of a widely dispersed scatter of surface and sub-surface archaeological deposits and features confined to an area roughly aligned with the rail tracks. However despite historical evidence of industrial activity adjacent to the project area and a row of “Miners Cottages” alongside the rail boundary within the project area, no archaeological evidence was recovered during sub-surface testing which could be associated directly with mining activities within the project area.

Significance Assessment

A detailed account of the significance assessment methodology undertaken for the Project is contained in Section 7 of Appendix I.

The Heritage Branch (Department of Planning, NSW) has developed criteria for assessing significance of archaeological sites and relics titled *Assessing Significance for Historical Archaeological Sites and Relics* (2009) which has been used for the Project. A ranking system for assessing heritage significance can provide a simple method for determining the relative significance of individual items or places. In accordance with the NSW Heritage Council Guidelines *Assessing Heritage Significance* (2001), the following criteria have been adopted for ranking of significance.

Table 49 Guidelines for Ranking Significance (NSW Heritage Council, 2001)

GRADING	JUSTIFICATION	STATUS
Exceptional	Rare or outstanding item of local or State significance. High degree of intactness. Item can be interpreted relatively easily.	Fulfil criteria for local or State listing
High	High degree of original fabric. Demonstrates a key element of the item's significance. Alterations do not detract from significance.	Fulfil criteria for local or State listing.
Moderate	Altered or modified elements. Elements with little heritage value but which contribute to the overall significance of the item.	Fulfil criteria for local or State listing.
Little	Alterations detract from significance. Difficult to interpret.	Does not fulfil criteria for local or State listing.
Intrusive	Damaging to the item's heritage significance	Does not fulfil criteria for. Local or State listing

The significance assessment applies to the entirety of the project area and the historical archaeological features identified within, this is provided in the following table.

Table 50 Statement of Significance for Historical Archaeological Sites within Project Area (Source: SKM)

NSW HERITAGE CRITERIA	STATEMENT OF SIGNIFICANCE	SIGNIFICANCE
Archaeological Research Potential (NSW Heritage Criterion E).	A high degree of intactness in the archaeological resource is necessary before a substantive contribution can be made to the research potential and hence, the ability of the archaeological resource to answer research questions for the site. The pit features identified during the survey program, and the sample of pit features excavated did not provide any explanatory archaeological evidence relating to their use or manner of origin. In particular no archaeological evidence indicated any link to historical mining activities in general or to the Old Anvil Creek Colliery operating between 1861 and 1864 on the other side (eastern side) of the railway from the project area.	None

NSW HERITAGE CRITERIA	STATEMENT OF SIGNIFICANCE	SIGNIFICANCE
	Therefore the project area is considered of little heritage significance since it does not fulfil the criteria for local or State listing as a heritage place as it has revealed little archaeological or research potential and has provided no evidence to suggest that further testing, such as enlarging the sample of features for excavation will present a data set to adequately answer the questions regarding their origin and possible links to historical industrial activity documented for the area and the features. Despite the paucity of archaeological evidence from survey and testing of the project area there remains a possibility that large scale surface clearance of top soil from the approximate location of the row of "Miners Cottages" may reveal some additional archaeological evidence pointing to occupation of the "Miners Cottages" during the brief operational life of the Old Anvil Colliery. However, the degree of ground disturbance in this area as a result of the formation of the trotting track, may mean that alterations detract from the original fabric and would make the site difficult to interpret. However, the "Miners Cottages" area is still considered to have some minor potential to yield archaeological information. The sample of pit features investigated have revealed little archaeological or research potential and therefore do not meet the criterion (E)	
Associations with individuals, events or groups of historical importance (NSW Heritage Criteria A, B & D).	From the results of the initial pedestrian survey and historical records the project area was considered of historical significance with pit features and historical artefact scatters identified. Accordingly, a sub-surface testing program was undertaken to establish the significance of the historical artefact assemblage and the wider project area context of local mining and economic developments. However, the results of the sub-surface testing were inconclusive and did not provide evidence that would associated the pit features or historical artefacts with the Old Anvil Colliery or other mining activities. The row of historic "Miners Cottages" is no longer extant and the pit features have no clearly defined evidential association with the local community or interest groups. The underground mine works could possibly have provided a link to historical events of importance, such as one of the first coal mines in the Hunter Valley region. However, the condition of the underground workings associated with the Old Anvil Creek Colliery are very poor with a degradation of condition as a result of subsidence, burning of coal and underground support structures and flooding by groundwater. All of the underground workings are sealed up to prevent public access. There are no features evident within the project area that can be related to the Old Anvil Creek Colliery establishment or operations. It is considered therefore that there are unsubstantiated connections with historically important mining activities or historically important people and therefore the archaeology within the project area does not meet the guidelines of the significance criterion (A), (B) or (D).	None

NSW HERITAGE CRITERIA	STATEMENT OF SIGNIFICANCE	SIGNIFICANCE
Aesthetic or technical significance (NSW Heritage Criterion C).	The row of historic “Miners Cottages” is no longer extant and the collection of pit features does not meet the criteria (C) because they have revealed no evidence of any type-defining characteristics.	None
Ability to demonstrate the past through archaeological remains (NSW Heritage Criteria A, C, F & G).	Survey and sub-surface testing provided no definitive evidence for an archaeological signature of the former “Miners Cottages” indicated on the 1873 map see Figure 4-1 on Appendix J except for an estimated date of an artefact scatter of the mid to late 1860s which corresponds to the period the Old Anvil Creek Colliery was operational. Given the short operational life of 1861-1864 for this Colliery the “Miners Cottages” are likely to have been very temporary, transient structures and have left little if any archaeological evidence of their existence. Similarly, the sample of pit features excavated did not provide any archaeological evidence of attributes defining a specific function or linking their origin to the early pioneering coal mining activities in the area.	None

The pit features identified during the survey program, and the sample of pit features excavated during sub-surface testing did not provide any explanatory archaeological evidence relating to their form, function or origin. In particular no archaeological evidence indicated any link to historical mining activities in general or to the Old Anvil Creek Colliery operating between 1861 and 1864 on the other side (eastern side) of the railway from the project area.

Therefore the archaeology within the project area is considered to be of little heritage significance since it does not fulfil the criteria for local or State listing as a heritage place. The project area has revealed sparse archaeological data and provides little research potential and no evidence to suggest that further testing, such as enlarging the sample of features for excavation will present a data set to adequately answer the questions regarding their origin and possible links to historical industrial activity documented for the area and the features.

The artefacts and features identified during the field program have been assessed as having little heritage significance, and therefore are not considered significant on a local or State scale. As such, in accordance with the Heritage Act 1977 (Section 4(1) the artefacts and features found in the project area are not considered to be ‘relics’ as a ‘relic’ must of State or local heritage significance.

Expanding on the criteria of archaeological research potential, SKM advise that 'there remains a possibility that large scale topsoil surface from the approximate location of the row of 'miners' cottages' may reveal some additional archaeological evidence'. Maxim Archaeology have undertaken this investigation and indeed found further archaeological evidence which included remains of miners' cottages and various mining artefacts. While this has provided further evidence, Maxim Archaeology's conclusion is that it has not changed the significance identified in the table by SKM.

Heritage Impact Assessment

This section provides a heritage impact statement identifying the potential impact of the Project on all known and potential historical heritage items identified within the project area. The majority of the heritage features identified during the search of heritage registers are located within the township precinct. Based on the distance from the project area and the nature of the proposed works, impact to these items is considered highly unlikely as a result of the proposed works.

The remaining heritage items listed in **Table 51** are within the project area or located within 500 metres. Impacts to these items vary. Notable heritage sites within 500 metres of the project area include the Great Railway Station Group, the Great Northern Railway and the Old Anvil Creek Colliery. Heritage impacts to these three major items are considered to be minimal and are discussed below:

Greta Railway Station Group

The Greta Railway Station group includes the railway buildings, station masters house, signal box, railway platforms and the footbridge. The Railway Station is located about 200 metres south east of the start of the project area, with a new access track to the project area being constructed to the south west of the station buildings. Other major features of the proposed works including buildings and additional tracks are located out of sight of the railway station buildings, which are at least 500 metres further to the north-west of the Railway Station Group.

Impacts to the heritage of the Station Group during construction will be minor. The Project would not directly generate additional train movements on the Main Northern Railway. It would service trains which currently already use the network.

As such, long term effects of vibration on the structural integrity of the Station buildings are unlikely. The Historical Heritage Assessment recommends that if rail traffic increases significantly past the Greta Railway Station as a result of the TSF construction or operations, then the long term effects of vibration on the structural integrity of the Station buildings should be considered. It also states that certain safeguards for the buildings if required could include vibration monitoring and regular structural checks prior to and after an increase in rail traffic so corrective strategies such as in ground barriers if necessary can be evaluated against recognised standards for the potential for building damage.

No additional rail traffic will result from the Project, as such, this is not likely to be a potential impact of the Project.

There will be a period of heavy traffic during the construction phase and continuing lighter traffic during the operational phase, however this does not constitute a threat to the Greta Railway Station Group and accordingly no heritage management recommendations are considered necessary.

The current view shed available while approaching the Greta Railway Station Group along Nelson Street is not threatened by the proposed structures associated with the Project since they have been located at the northern end of the project area. The development of the site for rail facilities is considered sympathetic to the continued transformation and modification of the industrial landscape with a history of mining and rail activities surrounding the project area.

Great Northern Railway

The proposed works are located immediately adjacent to the Great Northern Railway. However, as the nature of the proposed works is in keeping with the use of the Great Northern Railway, the impact to the heritage of the Railway is considered to be minimal.

Old Anvil Creek Colliery

The surface workings of the Old Anvil Creek Colliery are located on the other side of the railway line to the project area and therefore there are no impacts to remaining surface features as a result of these proposed works. However, the possibility of intact underground workings and the significance of these workings have been assessed.

Based on the poor and damaged condition of underground workings they have been assessed as having little or no significance. The impacts to the workings beneath the project area during the proposed works are likely to be caused by grouting, filling or stabilising the workings. Although this would result in the damage or destruction to some of the workings, the fact that there are many other examples of underground coal mines in the region, and more specifically in Greta, indicates that if impact were to occur to these workings, there would still be many other examples of underground workings in better condition within the region.

Table 51 Summary of Impacts to Heritage Items (listed in order of Level of Significance) (Source: SKM, 2010).

HERITAGE ITEM	HERITAGE REGISTER AND ID	SIGNIFICANCE ASSESSED IN THIS REPORT	LEVEL OF SIGNIFICANCE	DISTANCE FROM PROJECT AREA	LIKELY HERITAGE IMPACT	MANAGEMENT STRATEGY
Greta Railway Station Group	National Trust State Heritage Register (NSW) SHR (01156) Draft Cessnock LEP 2009 (I114)	No	State State Local	Approx 200m	Impacts unlikely. Potential impacts if rail traffic is increased	Monitor increases if rail traffic and protect structures if necessary.
Great Northern Railway Network	Draft Cessnock LEP 2009 (I251)	No	State	Borders eastern and northern extent of project area	Not impacted	None
Police Station, Lock up and Residence, 1 Water St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I115)	No	Regional ¹ Local	Approx 750m	Not impacted	None
Median Strip Group	Hunter REP 1989 Draft Cessnock LEP 2009 (I111)	No	Regional Local	Approx 800m	Not impacted	None
Greta Courthouse (former)	Register of the National Estate (I219) Hunter REP 1989 Draft Cessnock LEP 2009 (I108)	No	Local Local Local	Approx 700m	Not impacted	None
Greta Public School, Wyndham St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I116)	No	Local Local	Approx 600m	Not impacted	None
Masonic Hall (former) 67 High St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I103)	No	Local Local	Approx 800m	Not impacted	None
Methodist Church, High St, Greta	Hunter REP 1989	No	Local	Approx 900m	Not impacted	None
St Marys Anglican Church, Anvil St, Greta	Draft Cessnock LEP 2009 (I99)	No	Local	Approx 900m	Not impacted	None
Greta Uniting Church, 43	Draft Cessnock LEP 2009	No	Local	Approx 900m	Not impacted	None

¹ "Regional" is no longer used as a level of significance in NSW assessments.

HERITAGE ITEM	HERITAGE REGISTER AND ID	SIGNIFICANCE ASSESSED IN THIS REPORT	LEVEL OF SIGNIFICANCE	DISTANCE FROM PROJECT AREA	LIKELY HERITAGE IMPACT	MANAGEMENT STRATEGY
High St, Greta	(I102)					
Inn (former), 72 High St, Greta	Draft Cessnock LEP 2009 (I104)	No	Local	Approx 800m	Not impacted	None
Tattersalls / Greta Hotel, 88 High St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I105)	No	Local	Approx 700m	Not impacted	None
Greta Post Office (former), 94 High St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I106)	No	Local	Approx 700m	Not impacted	None
Greta Council Chambers (former), 96 High St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I107)	No	Local	Approx 700m	Not impacted	None
Two storey shop, 110 High St, Greta	Hunter REP 1989 Draft Cessnock LEP 2009 (I109)	No	Local	Approx 700m	Not impacted	None
Horse Trough,	Draft Cessnock LEP 2009 (I110)	No	Local	Approx 800m	Not impacted	None
Sandstone kerbs, gutters, drains and dam	Draft Cessnock LEP 2009 (I112)	No	Local	Approx 700m	Not impacted	None
Greta Bridges Group	Draft Cessnock LEP 2009 (I248)	No	Local	Closest is on Nelson Rd approx 300m	Not impacted	None
Anvil Creek Colliery (surface features)	Hunter REP 1989	No	Requires further investigation	Approx 300m	Not impacted	None
Water Storage Tanks	Hunter REP 1989	No	Requires further investigation	Approx 300m	Not impacted	None
Street of "Miners Cottages" (outside of project area)	Hunter REP 1989	No	Requires further investigation	Approx 100m	Not impacted	None
Street of "Miners Cottages" (in project area)*	Hunter REP 1989	Yes	None	Within project area	Impacted during TSF construction. The approximate area of the	Archaeological monitoring during construction phase recommended.

HERITAGE ITEM	HERITAGE REGISTER AND ID	SIGNIFICANCE ASSESSED IN THIS REPORT	LEVEL OF SIGNIFICANCE	DISTANCE FROM PROJECT AREA	LIKELY HERITAGE IMPACT	MANAGEMENT STRATEGY
					"Miners Cottages" will be within the construction area.	
Pit features within project area	Not registered	Yes	None	Within project area	Impacted during TSF construction Some of the pit features will be destroyed .	Archaeologist to document all pit features prior to construction
Underground mine workings associated with Old Anvil Creek Colliery	Not registered	Yes	None	Within project area	None	None

** This item was subject to further sub-surface testing undertaken by Maxim Archaeology as discussed below. While this has provided further evidence, Maxim Archaeology's conclusion is that it has not changed the significance identified in the table by SKM.*

Additional Field Work

It is noted that discussion of the results of the strategic sub-surface study of the study area must be preliminary at this stage pending the completion of artefact management.

The positions shown on the plan of Greta Colliery, 1873, demonstrated the existence of the huts but not their accurate locations. The scatter of artefacts at the MH11 survey site was an indication of episodic use, possibly for rubbish disposal, but not of residence. The fact that no residue could be determined in relation to the positions of MH10 and MH6 raises a question as to the durability of the structures and the possibility that some of 'huts' may have been glorified tents, as had been the practise on the goldfields little more than a decade earlier.

The fireplace footing at MH11-E, on the other hand, provides substantial evidence of the existence of a hut at this location, while the assemblage of artefacts broadly confirms occupation by a miner. The fact that no evidence of post holes was found provides the suggestion that the dwelling may have been structured on bed logs, supported either directly on ground or by simple stumps or logs and otherwise constructed of split slabs. The recovery of iron residues including nails and spikes confirms timber fixing, although probably not flooring. The building would probably have been bark-roofed. The bricks of the fireplace footing were thrown with a long narrow frog that was common in the Maitland area in the third quarter of the 18th Century. A residual deposit of coal dust on the eastern side of the fireplace contributes to the confirmation of occupation of this hut by a miner (who probably brought home a bucket of coal each day from the mine). A larger deposit outside the presumed alignment of the eastern wall suggested the location of a home stockpile of coal.

The artefact scatter at MH10-E was the only indication of human recourse in the general area of MH10, and has been discarded as representing a dwelling site. Like the scatter at MH11, this scatter also probably represented a rubbish disposal site.

The door sill and brick doorway apron at MH5-E also provided substantial evidence of the existence of a hut at this location, supported by a broad collection of artefacts including structural spikes and nails and of the residue household utensils and utilitarian items and a bone residue.

Although it was relatively sparse, the broad disposal scatter of artefacts concentrated to the south-east of the doorway raised the possibility of disposal of unwanted items, thrown from the doorway by a left-handed person. Two of the bricks/brick batts in the apron carried the definitive 'heart' frog of 'The Pack' period of brick making in Maitland which is tightly confined to the late 1860s. An example of this brick style was erroneously described at Figure 5-24 of the SKM report as 'probably a convict brick'. In passing, a 'diamond' frog brick in the course of field work was also located and secured during field work.

In summary, the structural material evidence at sites MH5-E and MH11-E, being a stone door sill and brick apron, and a fireplace footing, respectively, was found identified as MH11-E and a at MH5-E and does little but confirm the survival of residue from two cottages. The condition of these building residues was 'Substantially Intact' (for what they represented) and their integrity was assessed as 'Minor Modification'. There was also material evidence for domestic occupation in the eastern part of the project area. It would appear that miners lived in two of the huts identified and there is some evidence to suggest they may have been of German origin. The majority of artefacts found on site point to the discard of domestic rubbish.

In this context the suggestions on Maitland's 1873 plan appear to be generally validated, and the local belief of at least some of the miners' origins is supported. Otherwise, the material evidence at present makes little contribution to an appreciation of the lifeways and human condition of the early industrial workers. The study area may be viewed in common with the more substantial residual material evidence of the Greta Colliery, the known locations of Farthings Pit and the Anvil Creek Colliery, and the surviving evidence of railway connections and yards, to represent an early and evolving mining precinct. Within this precinct, however, the fragmentary nature of the material evidence and notable lack of structural evidence of the buildings (as opposed to that relating to building attributes) makes little significant contribution to the industrial heritage of the Greta locality and the wider South Maitland Coal Fields. In this context, the evaluation of cultural significance in the assessment report of SKM appears to be supported.

The Supplementary Heritage Report concluded that on present indications, further excavation in search of miners' huts would not appear to be warranted.

11.4 MITIGATION MEASURES

INDIGENOUS HERITAGE

There are several principles to the following management recommendations, as detailed below:-

- First and foremost, impact avoidance should be attempted. Where avoidance is not possible, impact mitigation strategies are required.
- Salvage excavation, collection or other mitigation that involves impact to cultural and archaeological sites should not be undertaken until the design has been finalised. This would ensure that sites are not unnecessarily disturbed, and that mitigation is appropriate.
- Salvage excavation should take place prior to ground disturbing activities in those locations.
- Salvage excavation should be reported upon, so that results are readily available.

The following mitigation measures are proposed to minimise the Potential Impact of the Project on Indigenous Heritage.

General

- All collected and salvaged material should be analysed and added to the existing data set, with a report produced on the salvage process, and analysis and discussion of the artefact data.
- It is recommended that Pacific National consider the possibility of formalising in some way the protected portions of the Sawyers Creek Artefact Scatter 1 and 2 (AHIMS# 37-6- 2165 and #37-6-2164). Pacific National should also consider including these sites on their Heritage Register.
- Pacific National should include Aboriginal cultural heritage material in their induction for this project for all personnel and contractors involved in construction and operation of the Greta Train Support Facility. The registered Aboriginal stakeholders may be useful in preparing this and could be engaged to assist in this.

Sawyers Creek Artefact Scatter 1 (AHIMS # 37-6-2165)

- All artefacts identified to date within the proposed impact zone should be collected. Representatives of the registered stakeholders should be invited to take part in this collection, in recognition of the cultural significance of this site.
- The remainder of the site (artefacts and PAD) to the west should be protected. Protection should take the form of some sort of robust, permanent, highly visible fencing and be put in place prior to construction work taking place.
- Pacific National may like to consider a local Indigenous company to undertake this work. Pacific National should ensure that everyone who enters the study area is made aware of this fencing and that it is a “no-go zone” – the area should be marked on all plans, including the Safety, Health and Environment Plan. No construction activities should take place inside this fenced “no-go zone”, including vehicle movement, laying down of fill materials, etc. Pacific National is committed to the protection of and preservation of heritage items and sites on land which it owns (see Heritage Management Standard in Pacific National’s Integrated Safety Management System). In line with this, the protective fencing on this site should be left in place and, if necessary, maintained for the duration of operation of the Train Support Facility.

Other than the above two points, no further investigation is recommended.

Sawyers Creek Artefact Scatter 2 (AHIMS # 37-6-2164)

- All artefacts identified to date within the proposed impact zone should be collected.
- In the area of intact dense deposit on the banks of Sawyers Creek (see Figure 19 in Appendix I), controlled manual salvage excavation should be undertaken.

This should take the form of a series of 4-6 interconnected 1 metre x 1 metre excavation squares to open up the location of and explore the nature of the deposit, including attempting to identify any stratified features and deposit.

If concentrations greater than 150 artefacts per square metre are encountered and/or *in situ* features such as knapping floors or hearths, then a further two 1 metre x 1 metre excavation squares should be excavated around the location. If possible, appropriate samples should be collected for radiocarbon dating. The location of transects/trenches should be decided upon in the field by the archaeologist. All excavated sediment should be sieved. The process should be recorded in detail.

- In the other two areas of disturbed dense deposit, controlled mechanical salvage excavation should be undertaken. Excavation should be undertaken by machine excavator equipped with a ~90cm wide mud bucket. Excavation should be undertaken in a series of two-three adjacent 5 metre long trenches in each location, each excavated in 5cm spits to sterile basal clay/gravel deposits (usually 20cm – 30cm). The location of transects/trenches should be decided upon in the field by the archaeologist. If concentrations greater than 150 artefacts per square metre are encountered and/or *in situ* features such as knapping floors or hearths, then a further two 1 metre x 1 metre excavation squares should be excavated around the location. Excavation should be fully documented and recorded. All excavated deposit should be sieved using a mechanical sieve fitted with ~ 4mm gauge punched metal plate or mesh.
- Representatives of the registered stakeholders should be invited to take part in the above collection and salvage, in recognition of the cultural significance of this site and the educational opportunities it presents.
- Detailed analysis of all material and any dates recovered from the site should be undertaken, the results of which should form, with the results already displayed here, part of a detailed technical report.
- The AHIMS site card for this site should be updated within six weeks of the completion of salvage excavation.
- The remainder of the site (artefacts and PAD) to the west, which is not affected by construction, should be protected. Protection should take the form of some sort of robust, permanent, highly visible fencing and be put in place prior to construction work taking place.

Pacific National may like to consider a local Indigenous company to undertake this work. Pacific National should ensure that everyone who enters the study area is made aware of this fencing and that it is a “no-go zone” – the area should be marked on all plans, including the Safety, Health and Environment Plan. No construction activities should take place inside this fenced “no-go zone”, including vehicle movement, etc.

Pacific National is committed to the protection of and preservation of heritage items and sites on land which it owns (see Heritage Management Standard in Pacific National’s Integrated Safety Management System). In line with this, the protective fencing on this site should be left in place and, if necessary, maintained for the duration of operation of the Train Support Facility. Additionally, to aid in protecting this area, fill material may be spread across the area and revegetated.

Contingency Measures

Below are contingencies for design/nature of works changes that may arise during detailed design, as well as contingencies for the accidental discovery of further Aboriginal cultural heritage (outside PADs).

Reduced Impact

- If, as a result of alterations to the design and/or proposed nature of works, a previously identified impact to an Aboriginal place, site or PAD is reduced then no further consultation or assessment is required for this change.

Increased Impact

- Where, as a result of alterations to the design and/or proposed nature of works, an impact on Aboriginal heritage or PAD as a result of a proposed change is considered to be greater than identified from the Approved Project, further consultation with registered stakeholders should be undertaken to identify any potential further assessment and/or other actions required prior to the works associated with this change occurring.

If any part of the project (such as ancillary facilities) is to be located outside the study area, additional consultation, survey and assessment should be undertaken before that part of the project proceeds.

Discovery of Aboriginal Cultural Heritage Material During Works

- At any time during construction, if Aboriginal cultural heritage material, features and/or deposits are found, all construction that could potentially harm the cultural heritage must cease (including stopping all construction within at least but not limited to 10 metres).

Only construction that is required to comply with occupational and environmental health and safety standards and/or to protect the cultural heritage should occur. Construction may recommence when the archaeologist has deemed that appropriate mitigation or salvage has occurred.

- a) Where Aboriginal cultural heritage material and/or deposits are discovered in the activity area, the sponsor must engage an archaeologist to record in detail the location and context of the material and decide if the material forms a new site or is part of a previously recorded site. The archaeologist must complete and submit relevant AHIMS recording forms to DECCW. The archaeologist should facilitate the involvement of the registered Aboriginal stakeholders and in consultation decide the most appropriate course of action for the material. This may include reburial of the material in a durable container to an area unlikely to be disturbed. If reburial is undertaken, the location of this should be recorded and all documentation provided with an updated AHIMS site card.
- b) If the cultural heritage material and/or deposits found are deemed to be *in situ* and of moderate or higher significance, it is preferable to avoid impact if possible. If avoidance is not possible, a suitably qualified and experienced archaeologist must be engaged to conduct salvage excavation. The archaeologist must facilitate the involvement of the registered Aboriginal stakeholders and develop a suitable methodology for salvage excavation in consultation with them.

This may include, but not be limited to, a 1 metre x 1 metre manually excavated trench (or more trenches of differing dimensions where appropriate and necessary) surrounding and encompassing the material/deposit, proceeding stratigraphically where possible and if not, in 5cm spits. This should also include, where possible and appropriate, collection of samples suitable for radiometric dating.

- c) The archaeologist and the registered Aboriginal stakeholders should then agree on the most appropriate course of action for the salvaged material and appropriate custodianship.

Non-Indigenous Heritage

Two assessments have been carried out in relation to non-indigenous heritage on the site. The first was undertaken by SKM which was a broad assessment of the site, and identified that, the features within the activity area appear to be related to opportunistic discard rather than industrial activity such as mining, and therefore are considered of low significance. Notwithstanding, it is evident that they have some significance in that they are unique to the local landscape.

Through discussions with the DOP an area identified as potentially having miners' huts on site required further investigation. As a result a second assessment was undertaken by Maxim Archaeology in the vicinity of the huts.

The results of SKM's archaeological testing and excavation indicate a low significance and no further sub-surface investigation was recommended. However, given the uniqueness of this collection of features, it is recommended that the remaining un-recorded features are fully recorded prior to work commencing on the site to provide a full record for future heritage reference. This recording would be non-invasive, be undertaken by an archaeologist, and comprise the taking of relevant dimensions, associated features and/or artefacts, and photographs. This recording should be detailed in a brief addendum to the Historical Heritage Assessment Report.

The second assessment undertook sub-surface investigation and recorded two features and a number of artefacts. The combination of the features and artefacts determined that the site was inhabited by miners in the mid-1800s.

When we combine the recommendations of the two reports, and consider the further work undertaken by Maxim Archaeology, the appropriate mitigation measure is to only stop work on site in the vicinity of any features found which are not related to the miners' huts.

11.5 CONCLUSION

Some items of Indigenous and Non-Indigenous heritage are located either on, or in close proximity to the site. The potential impacts of the Project on heritage have been considered at the early stages of the Project, including during development of the concept design for the Project. A number of changes were made to the site layout and design during the concept design phase to minimise the potential to impact of the Project on heritage items. These changes included realignment of the access track servicing the site and relocation of some buildings on site outside of the PAD areas.

These design changes, coupled with the mitigation measures contained above, reduce the potential for the Project to impact on heritage. After implementation of the mitigation measures discussed above, it is concluded that the risk of residual impacts to Indigenous and non-Indigenous heritage from the Project would be very low.

12 SOILS AND CONTAMINATION

12.1 INTRODUCTION

The Director-General's requirements identified soils and contamination as a key issue for the Environmental Assessment. This section identifies the potential soils and contamination impacts of the Project for construction and operation, as well as the mitigation measures to reduce these impacts. Any residual impacts are also discussed where applicable. The mitigation measures are further discussed in the draft SOC contained in Section 18. Table 52 below outlines the Director-General's requirements for soils and contamination and where they have been addressed in this report. Additional information on hydrogeology is contained in Section 16. Douglas Partners prepared a Preliminary Contamination Report for the Project, a copy of which is contained within Appendix K. The report was prepared giving consideration to *Managing Land Contamination Guidelines* (DUAP, 1998), *Guidelines for Consultants Reporting on Contaminated Sites* (EPA, 2007), *Guidelines for the NSW Site Auditor Scheme* (EPA, 1998) and *Sampling Design Guidelines* (EPA, 1995). A supplementary report was also prepared in response to a number of issues raised in the DGR's. A copy of this report is contained within Appendix F. Douglas Partners also prepared a Mine Subsidence Assessment of Pothole Risk report, a copy of this report is contained in Appendix S, and is discussed in.

Table 52 Director-General's Requirements for Soils and Contamination

DIRECTOR-GENERAL'S REQUIREMENTS	SECTION ADDRESSED
Potential land contamination, and where remediation is required, presentation of a Remedial Action Plan;	Sections 12.2.2 and 12.3.2 Appendix K
Natural soil constraints, including potential for methane gas and acid sulphate soils; and	Sections 12.2.1, 12.2.3-4, 12.3.1, 12.3.3-4, 12.4.1 and 12.4.3-4 Appendix F
Taking into account the <i>Managing Land Contamination Guidelines</i> (DUAP, 1998), <i>Guidelines for Consultants Reporting on Contaminated Sites</i> (EPA, 2007), <i>Guidelines for the NSW Site Auditor Scheme</i> (EPA, 1998) and <i>Sampling Design Guidelines</i> (EPA, 1995).	Section 12.1 Appendix K

12.2 DESCRIPTION OF EXISTING ENVIRONMENT

The following details a description of the existing environment on site in relation to soils and geology, contamination, methane gas and acid sulphate soils.

12.2.1 SOILS AND GEOLOGY

The 1:100,000 scale Newcastle Regional Coalfields Geology Sheet indicates that the site is in the area of outcrop of the Greta Coal Measures and the overlying Branxton Formation which is the basal member of the Maitland Group. The Greta Coal Measures typically comprises sandstone; conglomerate; siltstone; and coal, while the Branxton Formation typically comprises conglomerate; sandstone; and siltstone. The geology encountered while drilling was consistent with this description.

The underlying geology of the study region comprises Permian sandstones; shales; mudstones; siltstones; tuffs; conglomerates; limestone; and coal seams of the Singleton Coal Measures; Rutherford Formation; Farley Formation; Branxton Formation; Mulbring Siltstone; and Muree Sandstone (Kovac and Lawrie 1991).

The land-systems that cover the study area are the Rothbury (Red Podsollic Soils) unit and the Branxton (Yellow Podsollic Soils) unit. Sawyers Creek is located within the Branxton land-system, while the northern two thirds of the study area are covered by the Rothbury land-system (Kovac and Lawrie 1991). The Branxton land-system is gently undulating and dissected by waterways such as Sawyers Creek, with some erosional problems in areas cleared of vegetation. The Rothbury land-system is similar to Branxton, though tends to be hillier, with slope gradients slightly higher. Soils both Rothbury and Branxton land-systems are similar, comprising brown loams, loamy sands and sandy loams, underlain by a distinct change to yellow to bright brown strong structured medium clays, which are sometimes mottled yellow and/or grey (Kovac and Lawrie 1991). The topsoil horizon generally becomes shallower with further distance from alluvial land forms (e.g. up slopes, away from creeks/drainage lines).

As discussed above in Section 10.2.1 mine workings are present beneath the site, with the depth of cover to workings ranging from about 10 metres in the south portion of the site, to about 200 metres in the north-west corner of the site. There is an ongoing risk of pothole subsidence in the southern portion of the site for areas with less than about 30 metres cover. Additionally, a coal seam outcrops in the southern part of the site.

Pothole subsidence occurred in the southern portion of the site in February 2009, and was subsequently backfilled by the MSB. The MSB reported the surface expression of the pothole as about 30 metres long, 15 metres wide and up to about 10 metres deep.

Core drilling was undertaken on the site, see Drawing 1 of Appendix L and the following table for locations of core drilling. The core bores generally indicated a clay soil cover in the range 0.1 to 2.0 metres underlain by inter-bedded very fine grained sandstone and siltstone. The weathered rock was typically extremely low to low strength, but generally increased to medium of high strength between about 4 metres and 10 metres depth. The depth to the top of the Greta Seam was obtained in each bore with drilling continuing to the base of the seam/void or earlier termination due to ground conditions. The depths and levels of the top of the seam are summarised in the following table.

Table 53 Co-ordinated and Surface Level of Bore Locations, Depth and RL of the Top Seam

BORES	EASTING	NORTHING	SURFACE RL AHD	SEAM DEPTH (M)	SEAM RL AHD
Bore 1	348153.44	6382720.88	67.18	66.9	0.28
Bore 2	348334.15	6382747.72	56.91	33.25	23.66
Bore 3	348130.2	6382500.11	59.37	48.73	10.64
Bore 4	348297.2	6382577.79	53.84	24.4	29.44

12.2.2 CONTAMINATION

A Preliminary Contamination Assessment (PCA) was undertaken for the site by Douglas Partners (December, 2009) and is contained in Appendix K. The PCA involved a review of historical site records, previous reports and a site inspection.

An online search and correspondence with Council indicated that no building or development applications were recorded on the site. Council records list development from approximately 1987. A review of the Section 149 Planning Certificate indicated that the site has not matters arising under the CLM Act. However, it is noted that the CLM Act has since been amended, and Section 149 Certificates no longer provide comments relating to land contamination.

An online search of the NSW DECCW public register indicated the site has no statutory licences, applications or notices issued under the provisions of the POEO Act or the CLM Act.

The results of a review of aerial photographs are presented in the following table. It is noted that data obtained from aerial photos, particularly prior to 1991, was limited due to the relatively small scale and poor resolution of the aerial photographs.

Table 54 Review of Historical Photographs for the Site

YEAR	APPROX SCALE	BLACK & WHITE / COLOUR	DESCRIPTION
1963	1:40,000	B & W	- The Great Northern Railway line adjoins the site to the east. - Predominantly cleared land immediately adjacent to Great Northern Rail line extending north for approximately $\frac{3}{4}$ length of the site. - Predominantly cleared land north of Sawyers Creek, with numerous access roads evident across clearing. - Sawyers Creek alignment similar to current alignment. - A dam and possible disturbed ground is located adjacent to Sawyers Creek in the south-eastern portion of the site. - An access road appears to extend north, parallel to rail line in the east of the site. - Remainder of site appears to be naturally vegetated. - Existing development (possibly commercial) south of Sawyers Creek adjacent to rail line (not part of site).
1974	1:40,000	B & W	- Cleared land adjacent to rail line has extended to the west in the southern half of the site, approximately half of site cleared. - Rectangular divisions in cleared land in central-east area of site, possibly fenced paddocks. - Natural vegetation in northern portion of site, as well as in the western areas to the south. - Cleared corridor to the west of the site extending north and then north-west parallel to rail line (likely transmission line corridor).

YEAR	APPROX SCALE	BLACK & WHITE / COLOUR	DESCRIPTION
1984	1:40,000	B & W	- Central-eastern area re-vegetated with divisions no longer evident. - Dam constructed in northern section of re-vegetated area in the centre-east of the site. - Area south of Sawyers Creek is partially re-vegetated, with scattered vegetation visible.
1991	1:25,000	Colour	- Similar to the 1984 photograph. - Three new dams are present: two north of Sawyers Creek (one in clearing and the other on the edge of cleared and vegetated areas) and one between Sawyers Creek and developed land to the south-east of site. - Reduced vegetation south of Sawyers Creek compared to 1984 photograph.
2000	1:25,000	Colour	- Similar to the 1991 photograph. - Small area of cleared land adjacent to rail line in north of site. - Increased vegetation south of Sawyers Creek, similar to 1984. - Increased vegetation surrounding dam in centre-east of site. - Dam adjacent to Sawyers Creek (1963 photo) is no longer visible (possibly in-filled).
2006	1:16,000	Colour	- Trotting track visible in cleared land immediately north of Sawyers Creek, between the two existing dams. - Access road extending from transmission line corridor to the west to trotting track area. - Remainder of site appears similar to 2000 photograph.
2008	Digital	Colour	No major changes visible compared to 2006 photograph.

An historical title search was also undertaken. The results are presented in the following table.

Table 55 Historical Title Search (Source: Douglas Partners, 2009)

SECTION OF PROPERTY	PERIOD OF OCCUPANCY	OWNER(S)	POSITION OF OWNER(S)
Whole	1852 – 1954	Samule Clift (and his deceased estate)	Gentleman
Whole	1954 – 1964	Ronald John Turner, Gladys Ada Turner (from 1956)	Dairy Farmer
Whole	1964 – 1973	Edmund Alfred Lillis	Contractor
Whole	1973 – 1976	Jones Nominees Pty Ltd	-
B	1976 – 2005	Clyde Hedley George	Operator
A	1980 – 1987	Eric Bernard Holz, Patricia Elma Holz, Colin David Hedges, Carol Trudy Hedges	Butcher, Married Woman, Fencing Contractor, Married Woman
A	1987 – 1993	Patricia Elma Holz, Colin David Hedges, Carol Trudy Hedges	Widow, Fencing Contractor, Married Woman
A	1993 – 2008	Patricia Elma Holz, Carol Trudy Hedges	Widow
B	2005 – 2007	Roads and Traffic Authority	-
B	2007 – 2008	Patricia Elma Holz, Carol Trudy Hedges	Widow
Whole	2008 – Present	Pacific National (NSW) Pty Ltd	-

Northern Portion

The northern areas of the site is defined as extending as far south as the northern extent of the trotting track, located in the central cleared area of the site. Features noted in the northern portion of the site include:-

- Numerous partially-cleared areas, and areas of felled trees.

- Stockpiled bark over a possible hollow, with isolated bushes.
- Variable vegetation, including an area of predominantly Casurina growth.
- Numerous fill mounds, and localised depressions.
- Numerous gullies, draining in an easterly direction.
- Farm dam.

Central Portion

The central portion of the site has been defined as the area of the site which is to the south of the northern extent of the trotting track and north of Sawyers Creek. Features noted in the central portion of the site include:

- Trotting track in the cleared area to the east.
- Numerous farm dams in the east, in and adjacent to the cleared land.
- Area of fill in the south east of clearing.
- Areas of variable vegetation.
- Unsealed gravel access road extending westward from the cleared area to the western property boundary.
- Localised hydrocarbon impact to surface soils.

Southern Portion

The southern portion of the site has been defined as the area south of Sawyers Creek. Features noted in the southern section include:-

- Gravel access track extending from the southern boundary.
- Numerous areas of silling, some of which appear to have been quite recently placed at the time of investigation.
- Large area of mine subsidence.

Based on the available site history information, as discussed in Section 2 and site observations, the potential for contamination at the site is considered to be low. The principal sources of potential contamination are considered to be:-

- The presence of dumped rubbish and filling at various locations across the site. Anecdotal evidence suggests that filling used to rectify mine subsidence potholes has been sourced from within the site. The potential for contaminants within the fill is therefore considered to be low due to the general absence of contaminating activities within the site.
- The possible previous use of the site for grazing cattle or as a dairy farm which may have involved the use of chemicals including pesticides and insecticides associated with dairy farming.
- Localised oil spill observed within the cleared portion of the site which may be a source of elevated hydrocarbons in near-surface soils. This is considered low given the localised nature of the hydrocarbon spill.
- The adjacent Main Northern Railway, which may be a source of pesticides/herbicides and hydrocarbons which may migrate onto the site.

The potential for contamination at the site is considered to be low, with only minor potential contamination sources observed. As such, a Remedial Action Plan would not be required for the Project.

12.2.3 METHANE GAS

The presence of methane is common in coal seams and underground coal mine workings with methane a by-product of the coal-forming process. The presence of methane within former underground workings at the site cannot be discounted. Surface gas monitoring, including methane, was undertaken at select locations within the site on 14 January 2010. The locations were selected based on their potential exposure pathway risk. A copy of the results is contained in Appendix F and in the following table.

Table 56 Surface Gas Monitoring Results

LOCATION	EASTING	NORTHING	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	CO (ppm)	H ₂ S (ppm)	COMMENTS
G1	348272	6382310	0	0	20.1	0	0	Filled area in southern portion of the site (adjacent to access track)
G2	348395	6382533	0	0	19.9	0	0	Location of subsided filling in southern portion
G3	348386	6382547	0	0	19.9	0	0	Location of subsided filling in southern portion
G4	348381	6382685	0	0	19.9	0	0	Former test pit location (by others)
G5	348348	3682781	0	0-2.1	19.5	0	0	Borehole 211 (by others)
G6	348323	6382801	0	0	20	0	0	Possible 'shaft' / subsidence hole
G7	348249	6382964	0	0	20	0	0	Possible 'shaft' / subsidence hole (Shaft 6018)
G8	348211	6383040	0	0	20.1	0	0	Possible 'shaft' / subsidence hole
G9	348217	6383026	0	0	20.1	0	0	Possible 'shaft' / subsidence hole 15m south of Shaft 6018
G10	347873	6383439	0	0	20.2	0	0	Possible 'shaft' / subsidence hole (Shaft 6011 – rock lined)
G11	347853	6383454	0	0	20.1	0	0	Possible adit / trough adjacent to Shaft 6011

The results indicate that there was no detectable methane gas as the locality of the above surface features during the assessment.

12.2.4 ACID SULPHATE SOILS

Coastal, low-lying alluvial soils, generally lying below RL 5, but occasionally up to RL 10, AHD can contain pyrite or other sulphides. In such situations where the sulphides are kept out of contact with air, they are relatively stable and generally in 'equilibrium with the local environment. If sulphides come into contact with air, they have the potential to oxidise and form sulphuric acid.

Soils which have appreciable pyrite or other sulphides which have not yet reacted significantly with air are referred to as Potential Acid Sulphate Soils (PASS). Pyritic soils which have begun to generate acid are referred to as Actual Acid Sulphate Soils (AASS).

The site elevation is generally 50 to 70 AHD. Site soils are therefore not considered to be acid sulphate soils. This is reinforced by the site geology which generally comprises sandstone, conglomerate, siltstone and coal of the Greta Coal Measures and Branxton Formation. This geology is not associated with ASS.

Additionally, reference to the Acid Sulphate Soil Risk Map (Second Edition) for Greta prepared by the NSW Department of Land and Water Conservation indicates that there is no known occurrence of acid sulphate soil materials at the site.

12.3 ASSESSMENT OF POTENTIAL IMPACTS

12.3.1 SOILS AND GEOLOGY

The Project would have the potential to impact on soils and geology if not managed properly. Bulk earthworks and construction of the Project may impact on soil stability and erosion within the locality. Construction plant and machinery and vehicles driving off road may also disturb surface soils.

The main impacts of the Project on soils and geology relate to cut and fill required to allow construction of the rail tracks at a suitable grade to the main line, as well as buildings on the site. This would require the removal of some rock.

As discussed in Section 3.5, approximately 207,00m³ of cut would be required on site, while approximately 157,000m³ of fill would be required on site. This would result in an excess of 50,000m³ of fill material on site. Excess fill would be reused on site either during construction of the proposed acoustic mound in the southern section of the site or spread out in areas to be revegetated.

No cut would be removed from site. All excess cut would be disposed of onsite, through the construction of the acoustic mound or spread in the cleared areas as part of the revegetation strategy for the Project.

12.3.2 CONTAMINATION

Overall the site is considered to be suitable for the Project from a contamination perspective. The identified potential contaminants are considered minor and are unlikely to result in adverse environmental impact. A Remedial Action Plan (RAP) would not be required for the Project.

It is recommended, however, that the identified filled materials are investigated to assess their suitability to remain on site. This investigation could be readily undertaken during the early stages of construction.

12.3.3 METHANE GAS

Possible exposure pathways of methane gas to the surface and a likelihood of exposure is detailed below in **Table 57** below:-

Table 57 Methane Exposure Pathway and Risk

EXPOSURE PATHWAY	LIKELIHOOD OF EXPOSURE	COMMENTS
Mine subsidence potholing, which is the result of the collapse of shallow workings (approx 20m cover or less), potentially creating a pathway for methane to the surface.	Medium	Potholing occurred at the site in February 2009.
Uncapped shafts/drifts etc into the mine workings.	Low/Medium	Possible 'shafts' have been identified at the site, however the status of these is to be confirmed
Boreholes drilled into the mine workings from the surface. It is noted however, that boreholes are generally backfilled to minimise a connection with the workings and the surface.	Low	Temporary exposure route, normally backfilled following drilling
Excavation into shallow workings as part of remediation works i.e. excavation and backfilling of workings.	Medium/High	Possible exposure during remediation of shallow workings
Methane/groundwater displacement – displacement of mine water and methane during mine grouting works.	Low/Medium	Possible exposure during remediation of shallow workings

As discussed above, surface gas monitoring results indicate that there was no detectable methane gas on the site during the monitoring period. Notwithstanding, the presence of methane within former underground workings cannot be discounted. Further investigation, as described in Section 12.4.3 below, is recommended to be undertaken.

All buildings will be sited on the surface with mine workings greater than 40 metres. This would reduce the need for mine grouting works or to excavate shallow workings for remediation, however, some remediation works would be required to construct the access road and rail tracks in the southern section of the site. It is considered that the potential for encountering methane gas on site is low to medium.

12.3.4 ACID SULPHATE SOILS

The Project is not expected to impact on acid sulphate soils, and the risk of encountering acid sulphate soils on site is low. Accordingly no mitigation measures would be required.

12.4 MITIGATION MEASURES

12.4.1 SOILS AND GEOLOGY

Additional mitigation measures for soils and geology pertaining specifically to mine subsidence risk are contained in Section 10.4.2 of this report.

A conservative value of 40 metres cover was adopted during the concept design phase of the Project. All buildings, hard standards and fuel storage areas are located within areas of the site with greater than 40 metres cover over the coal seam. In areas less than 40 metres cover the mine workings below the footprint of the road and rail embankment would be fully grouted.

Douglas Partners recommended additional studies be undertaken on the site to investigate pothole subsidence between Sawyers Creek and the Main Northern Railway as well as the 'shafts' and 'subsidence troughs' identified. These studies are currently being prepared and the findings would be incorporated into the detailed design for the Project.

In addition to the above, an Erosion and Sediment Control Plan (ESCP) should be prepared for the Project by the construction contractor. The ESCP should aim to prevent erosion, restrict sediment movement, avoid sediment in run-off and control run-off.

12.4.2 CONTAMINATION

- The identified potential contaminants are considered minor and unlikely to result in an adverse impact. It is recommended that the fill materials identified in the Preliminary Contamination Assessment prepared by Douglas Partners (December, 2009) should be investigated further to assess their suitability to remain on site.

This investigation could be readily undertaken during the early stages of construction. If other fill materials are encountered on site during construction, it is recommended that the assessment of these materials be undertaken at that time.

12.4.3 METHANE GAS

- Further monitoring during site investigations and construction is recommended. This would comprise monitoring of methane levels at the surface and within excavations/bore holes that intercept mine workings during site investigations and construction. Monitoring should be conducted by suitably qualified and experienced personnel. If elevated methane levels are detected during further monitoring, standard mitigation measures such as cap and contain (i.e. physical barrier to control migration), or controlled extraction could be conducted if further management of methane is required. This would be done in consultation with the NSW Department of Primary Industry.

12.5 CONCLUSION

Soils and contamination were identified by the DGR's as a key environmental issue for the Project. Results of desktop and field studies indicate that there is a low potential for the Project to impact on contaminated soils. Given the amount of earthworks proposed, there is a potential for the Project to impact on soils if not properly managed.

Mitigation measures have been identified, and are discussed above to minimise the potential of the Project to impact on soils and contamination. Overall, it is considered that the Project is appropriate and would not result in any unacceptable adverse impacts on soils and contamination.

13 AIR QUALITY

13.1 INTRODUCTION

The Director-General's requirements identified air quality as a key issue for the Environmental Assessment. This section describes the existing environment, identifies the potential air quality impacts of the Project for both construction and operation, and recommends mitigation measures to reduce these impacts. Any residual impacts are also discussed where applicable. The mitigation measures are further discussed in the draft SOC contained in Section 18. **Table 58** below outlines the Director-General's requirements for air quality and where they have been addressed in this section of the EA report.

Table 58 Director-General's Requirements for Soils and Contamination

DIRECTOR-GENERAL'S REQUIREMENTS	SECTION ADDRESSED
Air pollutants, including an assessment of atmospheric pollutants of concern for local air quality, from fugitive and point sources;	Section 13.2
Potential odour from exhaust emissions; and	Section 13.3.2 Section 3.2 of Appendix L
Taking into account of the <i>Approved Methods for the Modelling and Assessment of Air Pollutants in NSW</i> (DEC, 2005).	Section 13.1.1

13.1.1 ASSESSMENT METHODOLOGY

Advitech prepared an Air Impact Assessment for the Project. This assessment was prepared in accordance with the NSW DECCW impact assessment criteria in the publication *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (2005). A copy of this report is contained within Appendix L.

13.2 DESCRIPTION OF EXISTING ENVIRONMENT

Assessment of background air quality data has been undertaken for the air shed in the vicinity of the Project. The NSW DECCW operate an air quality monitoring program that collects accurate real-time measurements of ambient level pollutants at 24 monitoring sites within the air quality monitoring network (AQMN), located around the greater metropolitan area of Sydney, the Illawarra, the Lower Hunter and selected rural sites around NSW. The monitoring location that is considered to be most representative of the Greta area is located at Beresfield approximately 30 kilometres to the north west of the proposed development.

The Beresfield monitoring station commenced operation in 1998 and provides data on the following air quality parameters: Ozone, Particulates, NO, NO₂, NO_x, and SO₂.

Background Concentrations

A Level 1 assessment of background concentrations was been prepared for the pollutants listed in **Table 59** below for the 2003 monitoring year to correspond with the meteorological data.

Table 59 Background Air Quality (Source: Advitech)

POLLUTANT	BACKGROUND CONCENTRATION	UNITS	AVERAGE TIME
TSP	44 ²	µg/m ³	Annual
PM ₁₀	Variable (refer to Figure 4 in Appendix X)	µg/m ³	24 Hours
	22		Annual
Volatile Organic Compounds (as n-pentane)	NA	mg/m ³	1 Hour
Oxides of Nitrogen	24 ¹	µg/m ³	1 Hour
	6		Annual
Carbon Monoxide	NA	mg/m ³	15 Minutes
	4 ¹		1 Hour
	3		8 Hours

POLLUTANT	BACKGROUND CONCENTRATION	UNITS	AVERAGE TIME
Sulphur Dioxide	NA	$\mu\text{g}/\text{m}^3$	10 minutes
	200 ¹		1 hour
	31 ¹		24 hours
	5		Annual
Lead	NA	$\mu\text{g}/\text{m}^3$	Annual
Dust Suppression	NA	$\text{g}/\text{m}^2/\text{month}$	Annual

¹ Reported value is the maximum result

² Assumed from PM_{10} background ($\text{TSP} = 2 \times \text{PM}_{10}$)

NA – not available

The maximum reported PM_{10} background concentration for the 2003 monitoring period was $87 \mu\text{g}/\text{m}^3$, which is above the DECC impact assessment criteria. As such, a Level 2 or contemporaneous assessment of the PM_{10} background concentration was required to understand the cumulative impact of the Project.

Sensitive Receivers

A number of potentially sensitive receivers were identified adjacent to the proposed development site:-

- To the east at Greta.
- To the south-east at Illalong.
- To the south off Tuckers Lane.
- To the north off the New England Highway.

In addition, receivers were located at the development site boundary. The location of potentially sensitive receivers adjacent to the development site is shown in **Figure 45**.

Figure 45 Sensitive Receiver Locations (Source: Advitech)



13.3 ASSESSMENT OF POTENTIAL IMPACTS

As discussed above, the maximum reported PM10 background concentration for the 2003 monitoring period was 87 µg/m³ which is above the DECC impact assessment criteria. As such, a Level 2 or contemporaneous assessment of the PM10 background concentration was undertaken to understand the cumulative impact of the Project within the locality.

The following figures present the predicted ground level concentration (GLC) for the proposed development at the site boundary and surrounding sensitive receivers. Background concentrations have not been included in the GLC contour figures, however, where a background concentration is available that data is presented in the results tables in Appendix L.

13.3.1 CONSTRUCTION

The construction activities with the potential to generate air emissions are:-

- Rock blasting and crushing.
- Stripping and stockpiling of topsoil and overburden materials.
- Operation of earth moving equipment (cut and fill) within the construction zone.
- Loading by front-end loaders or excavators to trucks or stockpiles.
- Dust generated by truck movements within the construction zone.
- Wind blown dust from stockpiles.

Figure 46 details the results of a Level 2 contemporaneous assessment of incremental and background concentrations of PM10 for the 2003 monitoring period which was undertaken to assess the cumulative impact of the construction period.

Figure 46 GLC for PM₁₀ (µg/m³) 24-hour Averaging Period – Construction (Source: Advitech, 2010)

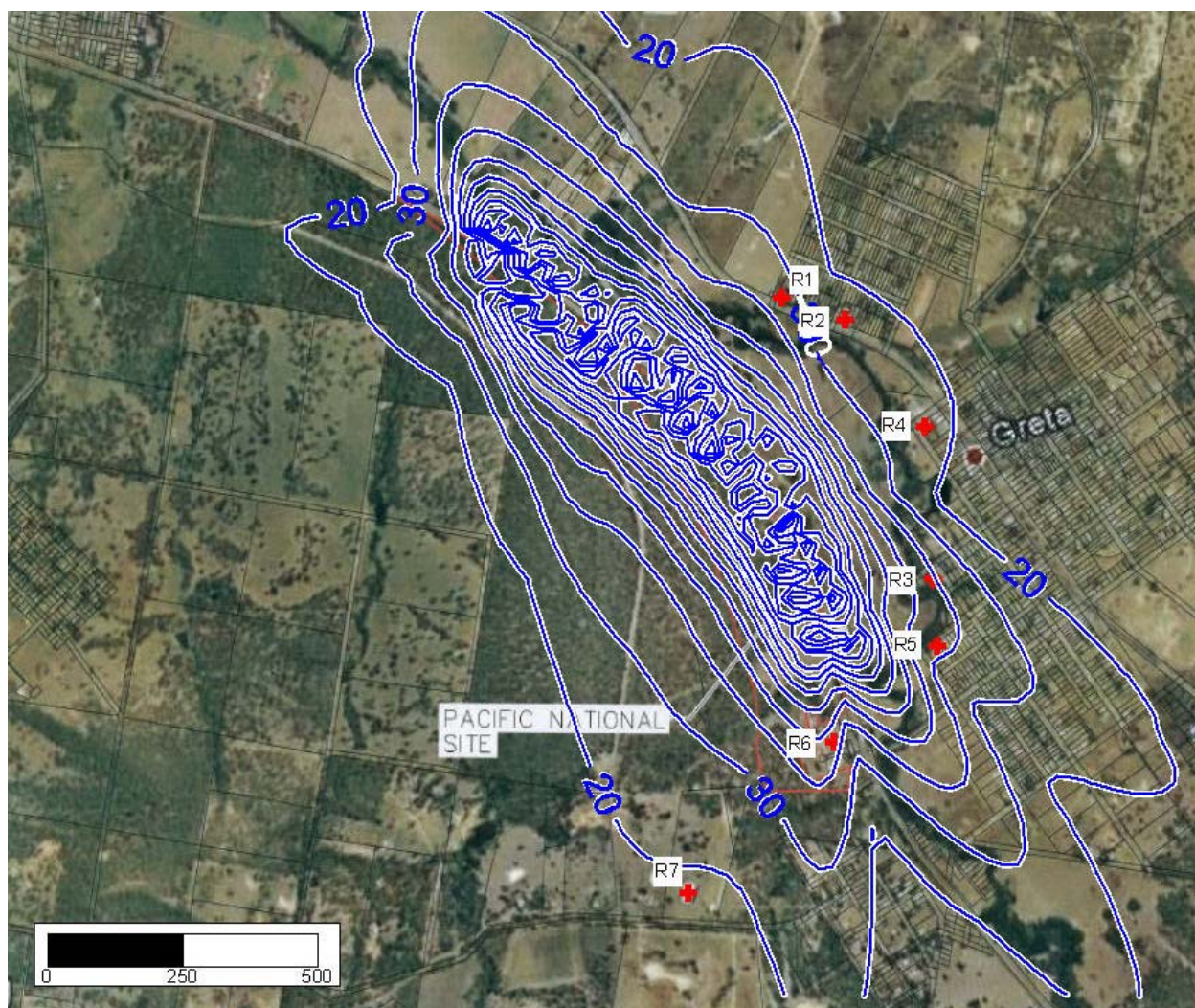


Table 60 indicates the number of predicted exceedences of the 24-hour impact assessment criteria at the site boundary and surrounding receivers.

Table 60 No. of Annual Predicted Exceedences of 24 PM₁₀ Criteria - Construction

RECIEVER ID	NO. OF EXCEEDEMCES OF 24-HOURS PM ₁₀ CRITERION ^{1,2,3}
Site Boundary ¹	35
1	7
2	6
3	4
4	2

RECIEVER ID	NO. OF EXCEEDENCES OF 24-HOURS PM ₁₀ CRITERION ^{1,2,3}
5	6
6	5
7	1

1 Reported value of the maximum predicted value

2 predicted increment + corresponding background value

3 Number of additional exceedences above that recorded in the background air quality data

Table 60 indicates that during the construction period up to an additional 7 exceedences of the impact assessment criteria at surrounding receivers may occur.

Table 61 displays the maximum predicted concentration occurs at each receiver and the corresponding background data to provide a worst-case concentration for each receiver.

Table 61 24-hour Average PM₁₀ (ug/m³) - Construction

RECIEVER ID	MAXIMUM PREDICTED INCREMENT	BACKGROUND	INCRIMENT + BACKGROUND	IMPACT ASSESSMENT CRITERIA
Site Boundary	90.6	22.7	113.3	50
1	34.9	26	60.9	
2	22.9	31.5	25.4	
3	40.8	13.0	53.8	
4	23.2	31.5	54.7	
5	42.4	13.0	55.4	
6	45.2	13.8	59.0	
7	18.5	13.8	32.0	

Air dispersion modelling predicted that during construction of the Project some short term exceedences of the PM₁₀ 24-hour impact assessment criteria are likely at surrounding residential receivers. This is attributed to already high levels of dust particles within the atmosphere.

The modelling shows that during the construction period up to an additional seven exceedences of the impact assessment criteria at surrounding residences may occur.

There are likely to be some exceedences of the $50 \mu\text{g}/\text{m}^3$ 24-hours PM_{10} impact assessment criteria during the construction period at times of elevated background concentrations. These impacts are likely to be short term only, and transient as construction moves around the site.

Review of PM_{10} emissions during periods of worst case operational, meteorological and ambient conditions indicates concentrations above the impact assessment criteria may be experienced at up to 105 receivers in the environment adjacent to the proposed TSF. The modelling shows that this maximum impact is likely to occur during the winter months (5 August). It should be noted that the construction program does not currently propose to undertake any earthworks during August so it is unlikely that exceedences will be experienced by all 105 receivers. If any changes to the construction program are required a contingency measure would be included in the CEMP for the Project. It is also important to note that this assessment represents the maximum number of receivers that may be impacted in a 24 hour period under worst case conditions.

To quantify the impacts, receivers were identified from cadastral data overlain on aerial photography of the receiving environment adjacent to the Project. Discrete receivers were considered to be any lot (developed or undeveloped). The counts are therefore considered to provide a conservative estimate of the actual number of receivers likely to experience impacts exceeding the impact assessment criteria.

Further, the AUSPLUME model incorporates physical dust suppression on roadways and stockpiles but does not account for operational safeguards that will mitigate dust generation during the construction stage of the project, as discussed in section 13.4.1 of this report.

The modelling results for Stage 1 indicate that the predicted ground level concentrations for annual average PM_{10} at all receivers will not exceed impact assessment criteria of $30 \mu\text{g}/\text{m}^3$.

The modelling results for the construction period indicate that the predicted ground level concentrations for annual average TSP at all sensitive receivers will not exceed the impact assessment criteria of $90 \mu\text{g}/\text{m}^3$.

The modelling results for the construction period indicate that the increases in average dust deposition levels predicted at all receivers as a result of the proposed operation will not exceed the dust deposition criterion.

No other air quality impacts are expected as a result of construction activities. In order to mitigate dust emissions from the site during the construction period some mitigation measures would be implemented.

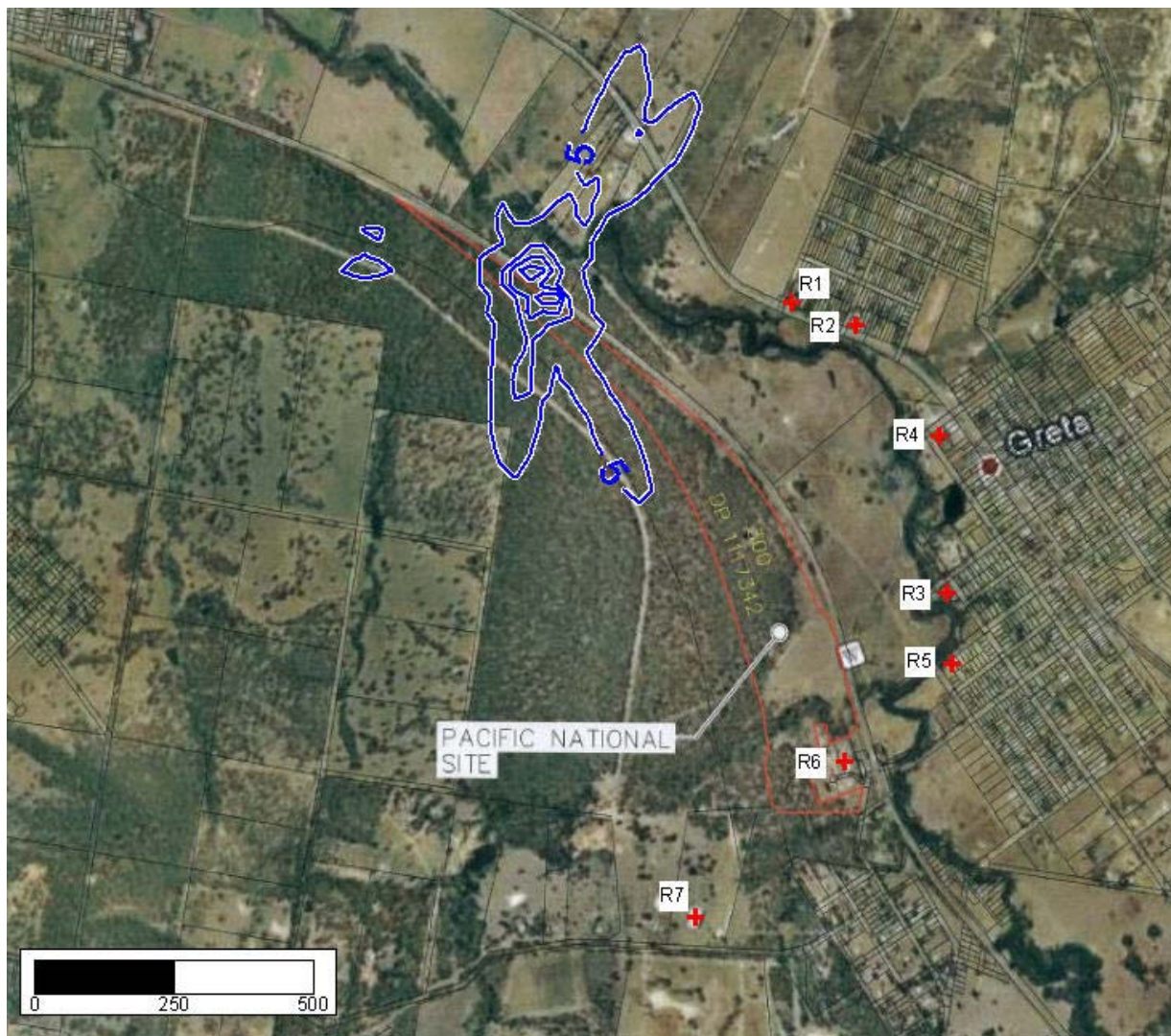
13.3.2 OPERATION

Stage 3 operations were modelled as they represent the peak of operational capacity for the Project and as such, it is assumed that compliance with air quality guidelines at this stage would result in compliance for less intensive operational Stages 1 and 2. The Stage 3 operational activities with the potential to generate air emissions are:-

- Idling of locomotive engines.
- Emissions from the diesel tank farm associated with dispensing and the displacement of vapour during tank filling.
- Welding operations.
- Spray painting.
- Operation of a sewage treatment plant (if required).

A Level 2 contemporaneous assessment of incremental and background concentrations of PM10 for the 2003 monitoring period was undertaken to demonstrate the cumulative impact of the proposed Stage 3 operation. The results of this assessment are detailed in **Figure 47**.

Figure 47 GLC for PM₁₀ (µg/m³) 24-hour Averaging Period – Stage 3 (Source: Advitech, 2010)



The air dispersion modelling results indicate that Stage 3 operation of the Project will not result in any additional exceedences of the impact assessment criteria of 50 µg/m³. Two exceedences are noted, one at the site boundary and one at R3. It is noted that these exceedences are due to an elevated background concentration of 59.3 µg/m³.

The modelling results for Stage 3 indicate that the predicted ground level concentrations for annual average PM₁₀ at all receivers will not exceed impact assessment criteria of 30 µg/m³.

The modelling results for Stage 3 indicate that the predicted ground level concentrations for annual average TSP at all receivers will not exceed impact assessment criteria of 90 µg/m³.

Emissions of NO_x were also modelled. The results in Table 14 of Appendix L present a worst-case scenario for emissions of NO_x which assumes the constant idling of nine locomotives and the simultaneous occurrence of an elevated background concentration. The modelling results for Stage 3 indicate that the predicted ground level concentrations for NO_x at all sensitive receivers will not exceed impact assessment criteria of 246 µg/m³. It should however be noted that the impact assessment criteria is for NO₂, a component of NO_x, and consequently the impact assessment criterion is conservative.

The modelling results for Stage 3 indicate that the predicted ground level concentrations for annual average NO_x at all receivers will not exceed the NO₂ impact assessment criteria of 62 µg/m³.

The modelling results for Stage 3 indicate that the predicted ground level concentrations for 10 minute average SO₂ at all sensitive receivers will not exceed impact assessment criteria of 712 µg/m³.

The modelling results for Stage 3 indicate that the predicted ground level concentrations for one hour average SO₂ at all sensitive receivers will not exceed impact assessment criteria of 570 µg/m³.

The modelling results for Stage 3 indicate that the predicted ground level concentrations for 24 hour average SO₂ at all sensitive receivers will not exceed impact assessment criteria of 228 µg/m³.

The modelling results for Stage 3 indicate that the predicted ground level concentrations for annual average SO₂ at all sensitive receivers will not exceed impact assessment criteria of 60 µg/m³.

The modelling results for Stage 3 indicate that the predicted ground level concentrations for 15 minute average CO at all sensitive receivers will not exceed impact assessment criteria of 100 mg/m³.

The modelling results for Stage 3 indicate that the predicted ground level concentrations for one hour average CO at all sensitive receivers will not exceed impact assessment criteria of 30 mg/m³.

The modelling results for Stage 3 indicate that the predicted ground level concentrations for eight hours average CO at all sensitive receivers will not exceed impact assessment criteria of 10 mg/m₃.

The modelling results for Stage 3 indicate that the predicted ground level concentrations for annual average lead at all sensitive receivers will not exceed impact assessment criteria of 0.5 µg/m₃.

The modelling results for Stage 3 indicate that the predicted ground level concentrations for VOCs expressed as equivalent n-pentane at all receivers will not exceed the impact assessment criteria of 33 mg/m₃.

The odour threshold concentration for diesel is between 0.25 and 0.7 mg/m₃. No odour impact from Stage 3 VOC emissions is expected.

During Stage 3 operation of Project modelling shows that all air and odour emissions from the site will achieve the relevant impact assessment criteria and consequently not result in any adverse impacts on surrounding sensitive receivers. As such, no mitigation measures would be required.

Waste Water Treatment Plant

The WWTP is not detailed on the development plans submitted with the Project Application. The detailed design of services, to and from the site, is still being finalised. A Waste Water Treatment Plant (WWTP) was modelled to represent worst-case scenario in the event that one would be required on site.

The separation distance between the WWTP and the nearest off-site residence is approximately 620 metres. The Level One odour assessment predicts that only areas in the near field of the WWTP will be affected by odour, and therefore the predicted zone of offensive odour is contained entirely within the TSF site.

As such, is very unlikely that any emission from sewage treatment will result in any offensive odour.

In the event that a WWTP is not required on-site, odour emissions will be nil or negligible.

13.4 MITIGATION MEASURES

13.4.1 CONSTRUCTION

In order to mitigate dust emissions from the site during the 12-14 month construction period the following measure would be implemented:-

- Minimising clearing ahead of construction activities.
- Minimising the area of land stripped for construction.
- Avoiding stripping of soil in periods of high wind.
- Using water application to increase soil moisture during stripping of soil.
- Revegetation of areas as soon as practicable following the completion of landform preparation to assist in stabilising the exposed surface.
- Using a water tanker to suppress dust on internal roads, cleared areas and stockpiles as required.
- Modify or cease work in periods of adverse meteorological conditions.
- Ongoing observation of dust generation and application of dust control as required.

13.4.2 OPERATION

The air dispersion modelling predicted that during the Stage 3 operation of the proposed Project all air and odour emissions from the site will achieve the relevant impact assessment criteria and consequently not result in any adverse impacts on surrounding sensitive receivers. As such, no mitigation measures are required.

13.5 CONCLUSION

During construction of the Project some short term exceedences of dust emissions from the site are likely at surrounding residential receivers. This may result in short term impacts to approximately 105 receivers at the start of August. This estimate is conservative and represents a worst case scenario. Further, the current construction program does not provide for earthworks to be undertaken at this time. If this changes, a contingency measure would be included in the CEMP for the Project.

The exceedences in the dust emissions criteria can be attributed to existing high levels of dust particles within the atmosphere. In order to mitigate dust emissions from the site during the construction period some mitigation measures would be implemented. These mitigation measures would allow a reduction in dust generated from the site. Dust impacts resulting from construction are likely to be short term only, and transient as construction moves around the site. As such, it is not expected that residual impacts would be significant.

Stage 3 operations represent the peak of operational capacity for the Project and as such, it is assumed that compliance with air quality guidelines at this stage would result in compliance for less intensive operational Stages 1 and 2. During the Stage 3 operation of Project all air and odour emissions from the site would achieve the relevant impact assessment criteria and consequently not result in any adverse impacts on surrounding sensitive receivers. As such, no mitigation measures are required, and no residual impacts are expected.

14 **SOCIAL AND ECONOMIC**

14.1 **INTRODUCTION**

Social and economic issues for the Project were identified as a key issue during the environmental risk assessment undertaken for the Project. This section details the social and economic environment surrounding the Project. It includes an analysis of the demographic profile as well as a discussion on economic, cultural and social aspects of the locality. The potential impacts of the Project on these characteristics are discussed and where relevant, mitigation measures are identified to reduce the potential impact of the Project on the social and economic environment.

In recognition of the potential impacts of the Project on the community, community consultation was undertaken for the Project. This consultation was undertaken to obtain the community's view on the Project and detail any issues they have for consideration in the Environmental Assessment. A community meeting was held on 20 February 2010, and is discussed below.

The project has the potential to have both positive and negative impacts on the social and economic environment. Stakeholders include landowners and local residents as well as businesses and industry within the region, including coal mining and associated activities.

14.2 **DESCRIPTION OF EXISTING ENVIRONMENT**

Key Insights prepared a Social Impact Assessment for the Project while Hill PDA prepared an Economic Assessment for the Project. A copy of these reports are contained within Appendix M and Appendix N respectively.

14.2.1 **ECONOMIC**

Hill PDA report that the coal industry provides significant economic benefits to Cessnock, New South Wales and Australia. According to the Lower Hunter Regional Strategy, 14% of Australian exports are derived from the Hunter and 95% of exports from Newcastle Port are coal.

The coal chain in Newcastle is expected to expand in the next five years, potentially doubling the current level of export.

Pacific National need to ensure that they can meet this expected increase in demand. Therefore, the facility will provide National and State economic gains by ensuring that coal export expansions can continue to increase.

14.2.2 SOCIAL

A social impact comment was prepared by Key Insights to consider the likely social impacts in the Greta community as a result of the development. The summary of the Greta community identifies Greta as a working class area with slightly higher unemployment than the State average with a population which has skills, which are ideally suited to the construction and operation of the proposed Train Support Facility.

The age profile of Greta residents was compared to that of Cessnock city and the Greta area is representative of overall age profile within the Cessnock city local government area. The minor separation in the profile between the local government area and the Greta area showed that the Greta area have a proportionally higher level of younger people aged 11 years and younger, and a proportionally lower level of older people aged 60 years and over. Of interest was that residents aged 25 to 59 years which is considered to be those of working age, Greta has a slight increase proportionally when compared to the LGA average.

The Greta area has a growing population which expanded from 3,894 persons in 2001 to 4,150 in 2006. This represents a 6.5% increase in population and reflects the strong growth projected to occur in towns and villages along the population corridor between Newcastle and Singleton. This growth needs to be supported by infrastructure and employment.

Key Insights also reviewed the educational qualifications of the Greta population. Of note, was that 21% of Greta residents have education to the Year 12 level or greater, compared with 42% for New South Wales and 31% for the Hunter Region. Key Insights concluded "That there is a large supply of manual and/or service orientated skills in the local area when compared with the Hunter Region and New South Wales as a whole."

The employment status of a population is an important indicator of a socio-economic status of an area. The unemployment rate in Greta is currently 6.7% which is higher than the New South Wales rate of 5.9%, however, is lower than the Cessnock local government area rate of 8.6%.

The work force participation rate together with the unemployment rate, which was better than the Cessnock local government area as a whole, points to Greta as a small area with a strong working profile. Of those employed, the most popular industry sectors were manufacturing with 13.5%, mining with 12.3% and retail trade 10.5%.

When comparing the sectors where people are employed with the Cessnock local government area as a whole, it was found that a higher percentage of persons were employed in mining compared to the local government area, similarly with construction, however, a smaller percentage of persons were employed in health care and social assistants and in retail trade. Similarly, in looking at employment occupations, a larger percentage of persons were employed as machinery operators and drivers as with technicians and trade workers when compared to the Cessnock local government area as a whole, and that the percentage of persons employed as sales workers or professionals was less in Greta as a percentage when compared to the Cessnock local government area.

The demographic overview provided by Key Insight includes *“The main differences between the Greta community and the Cessnock LGA community relate to the age, employment, household and earning expenditure profiles. Generally speaking Greta residents are younger, have slightly higher skill and education levels and have lower levels of unemployment and higher levels of work force participation. These factors combined with higher household earnings, rent and mortgage profiles, reveal a picture of slightly more affluent “working class” area than the LGA average”.*

14.3 ASSESSMENT OF POTENTIAL IMPACTS

14.3.1 SOCIAL

The dominant industries of employment for Greta residents and the current profile of the Greta workers, suggests that the Train Support Facility would be well situated and will employ the workers that already possess the skills required to firstly construct and secondly operate the support facilities. The benefits to the community of providing local employment are significant and the predominant social impact will be the amenity issues. The following table prepared by Key Insights identifies the likely impacts from a social perspective as a result of the development.

Table 62 Social Impact Matrix (Source: Key Insights)

SOCIAL IMPACT ISSUE	COMMENTS/RISK	SIGNIFICANCE	FURTHER INVESTIGATION/ POTENTIAL MEASURES TO BE EXPLORED
Accessibility	- Located in close proximity to state significant road and rail infrastructure/linkages. - Adjoins public rail link and station. - Suitably located for regional coal train transport logistics. - On-site access roads and placement of facilities to be confirmed. - Nearby neighbours may be concerned about access to their properties particularly when considered in conjunction with the construction and opening of the Hunter Expressway.	High	Continue to implement 'Near Neighbour Consultation Strategy' for ongoing proactive engagement and communication with surrounding residents prior to DA submission and throughout construction and operations.
Amenity and Character	- Development has potential to adversely impact on the amenity of nearby and adjoining neighbours. - Amenity impacts will be further considered in the SIA, with particular considerations towards approved infrastructure (third rail line and F3 extension) located within close proximity to the site.	Medium	Implement mitigation strategies from acoustic, pollution, traffic and visual impacts on near neighbours.
Crime and Public Safety	- It is anticipated that all safety requirements under OH&S guidelines will be employed during design, construction and operational phases. - It is anticipated that the proposal will not impact upon local crime.	Low	Promote security protocols to prevent public access to the TSF. Promote the Emergency Response Plan.
Demographic Change	Local areas are projected to experience significant population increases. The rezoning and development has potential for creating direct and indirect employment to the growing population (such as localised onsite to regional coal-associated jobs).	Low	Nil

SOCIAL IMPACT ISSUE	COMMENTS/RISK	SIGNIFICANCE	FURTHER INVESTIGATION/ POTENTIAL MEASURES TO BE EXPLORED
Economic Trends and Employment	• Supports coal logistics across the Hunter region and increases the coal export capacity of the port. Increases the efficiency of the coal supply chain, providing economic benefits for stakeholders in the Hunter Valley coal industry, coal producers, NSW State government, employees of the wider coal chain. Increased regional competition, ensuring competitiveness in the pricing cycle. • Development is located near a deep pool of workers, accessible to the population centres of Cessnock, Maitland and Newcastle. • Creation of short-term and long- term positions, direct and indirect employment, and local and regional job opportunities. • Development will aid the capture and retention of both servicing and provisioning, and other associated industry skills within the region. • To be determined by an Economic Impact Assessment (EIA).	High	Wherever possible, utilise local and regional businesses and materials during construction. Promote the employment of local and regional persons.
Environment	• To be determined by an Environmental Assessment (EA).	Medium	Implement recommendations in relation to the proposer management of environmental issues.
Groups with particular needs	• Not relevant to the development	Nil	Nil
Health	• Key Insights is not qualified to comment on health impacts.	Nil	Nil
Heritage and Culture	• Key Insights is not qualified to comment on heritage or cultural impacts.		Implement recommendations of Heritage/Cultural study.

SOCIAL IMPACT ISSUE	COMMENTS/RISK	SIGNIFICANCE	FURTHER INVESTIGATION/ POTENTIAL MEASURES TO BE EXPLORED
Housing	Not relevant to the development	Nil	Nil
Interaction Between Development and Existing Community	Opportunity to provide employment to existing community.	Low	Promote the employment of local and regional persons.
Neighbours and local community	- Potential to adversely impact adjoining and near neighbours' amenity if identified risks and impacts are not mitigated. - There is a risk to the project that climate change activists and other community members opposed to the expansion of the coal industry will focus some of their opposition on this development as it is a component of that expansion. This could cause stress in the local community.	Medium	Utilise a Stakeholder Register and Risk Assessment and the Community Engagement Plan. Continue to implement the 'Near Neighbour Consultation Strategy' for ongoing proactive engagement and communication with surrounding residents.
Regional Significance	- Development will open up and increase competition within the Hunter Coal haulage market - Site is more suitable than other regional industrial lands due to its access to both road (Hunter Expressway, New England Highway) and rail transport modes. - Increased efficiency of the regional coal chain will lead to increased coal volumes and increased employment opportunities. - Suitably located for regional coal train transport logistics.	High	Nil
Traffic and Transport	Strategically located in proximity to key rail and road transport infrastructure linkages (Hunter Expressway, New England Highway).	Medium	Implement traffic mitigation strategies (e.g. speed limits) as per traffic Study.

SOCIAL IMPACT ISSUE	COMMENTS/RISK	SIGNIFICANCE	FURTHER INVESTIGATION/ POTENTIAL MEASURES TO BE EXPLORED
			Keep near neighbours informed of decisions regarding access arrangements to TSF site
Tourism	Not relevant to the development	Nil	Nil

14.3.2 **ECONOMIC**

Hill PDA prepared an estimate of jobs created as a result of the construction and operation of the Facility. This estimate was based on a cost of \$110 million for the capital cost of the development and found the following jobs and economic impacts were likely to be created as a result of the injection of funds into the local economy.

- Contribute around \$110 million directly in construction to the economy. This is equivalent to at least 615 job years directly in construction related activities.
- The construction industry has strong linkages with other sectors so its impacts on the economy go further than a direct contribution of construction. Multipliers refer to the level of additional economic equity generated by a source industry.
- Based on National benchmarks, a construction cost of \$110 million will generate a further \$99 million of activity and production induced effects and \$106 million in consumption induced effects.
- Total economic activity generated by the construction proposed development is at least \$315 million.
- During construction, the development as a whole will generate at least 2,527 job years in the economy through both direct and multiplier impacts (this is made up of a combination of 615 job years through direct construction and 1,913 through both production induced effects and consumption induced effects).
- Provide around 38 full time and part time jobs on site post construction.
- Contribute at least \$8.7 million per annum to NSW Gross Domestic Product brought about by workers involved in the operation of the Project.

The Project would be a significant investment in infrastructure to the coal industry within the Hunter Region.

As previously discussed in this report, the export of coal and coke from New South Wales in 2007/2008 was \$6.2 billion with the vast majority of this coal leaving via the Port of Newcastle. The Hunter Valley coal chain is responsible for the efficient delivery of coal to the Port. Pacific National is a critical link in the coal chain, providing bulk haulage of approximately 85% of all Hunter Valley coal. The export of coal through the Port of Newcastle is predicted to grow to approximately 145mtpa by 2011 and potentially to 211mtpa by 2015.

The economic assessment prepared for the Project is based on the capital expenditure of the Project and the continuing operation of the Project locally. It does not cover the broader impacts of improvements in the coal chain which will drive further positive broad economic impacts.

14.4 MITIGATION MEASURES

In order to more thoroughly analyse and respond to the potential positive impacts and mitigate the potential negative impacts of the proposal Key Insights suggests the following for consideration:-

- Implement recommendations from air quality, acoustic, traffic and environmental impact studies.
- Incorporate acoustic, pollution and visual mitigation strategies wherever necessary and/or possible throughout the construction and operation phases.
- Continue to implement the 'Near Neighbour Consultation Strategy' for ongoing proactive engagement and communication with surrounding residents. Within this strategy, develop and implement policies which aim to increase project knowledge and create effective communication mechanisms.
- Utilise and monitor the Stakeholder Register and Risk Analysis Assessment.
- Continue to engage with the local residents, near neighbours and key community stakeholder groups, and provide up to date information as it becomes available. This will assist in mitigating community concerns and answer key questions that may be publicly raised.

- Provide factual information on the general operations of Pacific National.
- Wherever possible, utilise local and regional businesses, resources and materials during construction.
- Promote the employment of local and regional workers to retain and develop the local skills-base.
- Implement the creation of buffer zones or other mitigating measures around the development, as recommended by expert consultants, to enhance the protection and minimisation of disturbances of the amenity of neighbouring properties, particularly those situated near the southern boundary.

14.5 CONCLUSION

A qualitative assessment of the range of potential impacts that could arise from the construction and operation of the Project is outlined below. In particular, the Project would generate some social impacts to some local residents through the provision of local jobs. Other social impacts are linked to changes in lifestyle due to the issues discussed throughout this report and include impacts associated with loss of views, impact of traffic movements etc. No land acquisition would be required for the Project and there would be no changes to existing land access arrangements.

15 VISUAL IMPACT

15.1 INTRODUCTION

Visual impact was identified as an additional key environmental issue to the DGR's during the Environmental Risk Assessment Process detailed in Section 17. The following chapter details the existing visual environment, discusses the potential impact of the Project on this existing environment and recommends mitigation measures to be implemented during construction and operation to minimise the visual impact of the Project. The primary visual impact of the Project would be as a result of changes to the natural landscape through the construction of buildings and ancillary site infrastructure. Additionally, as 24 hour operation is proposed, lighting also has the potential to result in a visual impact. Moir Landscape Architecture prepared a Visual Impact Assessment, while WEBB Consultants undertook an assessment of potential Lighting impacts for the Project. A copy of the Visual Impact Assessment is contained in Appendix P and a copy of the Landscape plan is present in Appendix Q.

15.2 DESCRIPTION OF EXISTING ENVIRONMENT

The majority of the site has extensive tree coverage with a large area of cleared land occurring towards its southern end. Sawyers Creek, and associated vegetation traverses the site towards its southern end. The surrounding area is a mix of land uses with rural holdings; vineyards; established and new residential areas; mining; and large areas of existing bushland. The area is experiencing continued development, primarily with the expansion of existing residential areas on former rural land. Identified future growth areas include the Huntlee/Branxton new town (3km north-west of the study area) and the proposed extension to the F3 Freeway immediately west of the study area. The Main Northern Railway and associated land forms the north and east boundary to the study area. Greta Railway Station and residential properties are located south of the study area.

The broader landscape within the locality is characterised by a mosaic of open agricultural land with patches of forest and woodland including riparian vegetation and residential allotments.

The majority of the site has extensive tree coverage with a large area of cleared land occurring towards its southern end. Sawyers Creek and associated vegetation traverses the site towards its southern end.

Landscape Character Units (LCU) for purposes of this assessment are defined as:-

- LCU 1 - Forest Rural Land south of The Main Northern Railway.
- LCU 2 - Rural Land north of The Main Northern Railway.
- LCU 3 - Commercial and residential villages of Great and Branxton.
- LCU 4 - Residential areas of North Rothbury and Illalong.

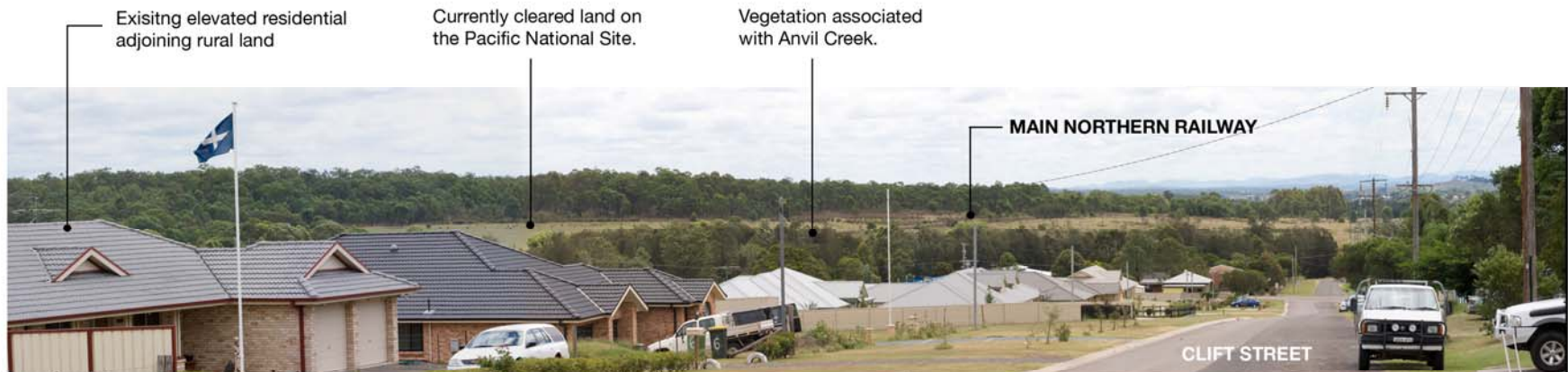
15.3 ASSESSMENT OF POTENTIAL IMPACTS

A survey of the surrounding locality and topographical maps was undertaken to select prominent locations which the site may be visible from. This was followed by field inspections to ascertain the visibility from these sites. Further viewpoints were selected by driving or walking around the site area. From these investigations, 15 locations were selected to undertake a viewpoint analysis from. Of these 15 locations, only two were considered to have a potential impact. Based on this it can be concluded that views of the site from surrounding locations are limited. The greatest visual impact is likely to be from residential areas on elevated land towards the southern parts of Greta. The study area is also visible from elevated sections of the New England Highway mid way between Branxton and Greta. The Project would also result in a visual impact on train passengers and viewers in close proximity to Greta Railway Station, including adjoining residential properties located towards the southern extent of the site. Photomontages have been prepared for the Project depicting the likely views from these locations, as detailed in Figure 27 and Figure 28.

The photomontages show that the visual impact of the Project is expected to be low with large areas of landscaping being the predominant visual feature. Some buildings and infrastructure elements would likely be visible from Cliff Street, however, the impact of these is not significant due to the distance (approximately 1km) and the use of appropriate building materials and landscaping which soften the impact of the built form. The study area is largely screened from the west, including Tuckers Lane, Main Road and North Rothbury due to topography and existing vegetation. The study area is not visible from residential housing in Branxton due to distance, topography, existing vegetation, and built elements such as rail sidings, embankments and noise attenuation fencing.

Riparian vegetation associated with Anvil Creek provides a dense visual barrier to the study area from the majority of residential areas in Greta, excluding existing housing and developing areas in the southern, elevated parts of town. Lower parts of the New England Highway, especially areas in close proximity to the riparian corridor are also screened from view.

Figure 48 Photomontage - Cliff Street (Source: Moir Landscape Architecture)



Existing view from local high point (Clift Street)



Proposed view from local high point (Clift Street)

Figure 49 Photomontage – Greta Railway Station (Source: Moir Landscape Architecture)



Existing view from view from Greta Station



Proposed view from Greta Station

The Project would result in some impacts on the existing surrounding environment in terms of landscape and scenic values. The visual impacts would vary depending on the viewing location. Any visual impact would result from the removal of existing vegetation and construction of buildings and associated rail infrastructure. It is unlikely that the Project would result in a significant visual impact due to both the distance of the Project to the viewpoints as well as the change in site levels. Where buildings and infrastructure may be visible, landscaping would help soften any potential visual impact. Landscaping is discussed in detail in Section 3 of this report, and a landscape masterplan has been prepared and submitted with the application. The landscape masterplan details proposed revegetation areas on the site as well as the landscaping treatment for the proposed access road and buildings on site. Bushfire protection areas are also detailed. An assessment of visual impact should be viewed in light of the future F3 Freeway extension located on land immediately west of the site and ARTC's proposed third track to the east of the site. In this regard, it is evident that the site is in a transitional locality. Consequently, the visual impact from the Project itself is not expected to be significant.

15.3.1 LIGHTING

The existing site is vacant and no lighting is currently present on the site. Due to the proposed 24 hour operation, the Project would require lighting to illuminate buildings and some sections of tracks and access roads. This has the potential to have a visual impact on surrounding residences through lighting glare if not properly designed and managed. WEBB Australia was engaged to provide a preliminary lighting design for the Project and provide an assessment of the impacts of lighting as a result of the 24 hour nature of the facility. The lighting design for the facility was based on lighting requirements which are outlined in the relevant Australian Standards. These include:-

- AS1158.1.1 Part 1.1: Vehicular Traffic (Category V) Lighting—Performance and Installation Design Requirements.
- AS1158.1.3 Part 1.3: Vehicular Traffic (Category V) Lighting—Guide to Design, Installation, Operation and Maintenance.
- AS1158.2 Part 2: Computer Procedures for the Calculation of Light Technical Parameters for Category V and Category P Lighting.

- AS1158.3.1 Part 3.1: Pedestrian Area (Category P) Lighting—Performance and Installation Design Requirements.

The proposed lighting design was then assessed against the following Australian Standard and a number of suggested design measures outlined to ensure that the design meets the Australian Standard.

- AS4282: Control of Obtrusive Effects of Outdoor Lighting.

The key areas within the Project that requires lighting are:-

- The access Gate and Access Road.
- Administration and car parking areas.
- The Locomotive and Wagon standing and maintenance areas.
- The vehicle service centre.
- Train servicing facilities on site.
- The Provisioning shed.
- The Pathways around the site.

The objectives of the exterior lighting of the site are to:-

- Provide a high level of environmental lighting standards to minimise energy consumption and to reduce overall environmental impact.
- To minimise and where possible prevent spill light and “sky glow”.
- To prevent a glare free environment for those using the site.
- Make use of the latest technology to provide for effective conversion of light into illumination.
- To reduce potential adverse affects on nearby neighbours including:-

- Residential properties.
 - The Rail transport signalling.
 - The Hunter Expressway users.
- Provide a safe working environment for people within the site.

As discussed above, WEBB Australia has provide a preliminary design and undertaken an assessment of the potential concerns that may raised with regard to lighting the site, including any issues raised in the Director General's Requirements.

The preliminary design proposed by WEBB proposes the following:-

- Use of suitable fixtures to ensure that an area is not over lit, with fixtures being angled correctly, the beam shape is appropriate and the number and wattage of fittings minimise to reduce glare.
- Minimise upward light.
- Provide lights that can be turned off or dimmed when not in use.
- Ensure that the main beam angle of light directed towards a potential observer is not more than 70%.
- For Road users, limit light near to and above the horizontal.
- Undertake regular maintenance.
- Make use of two tier systems that provide a low level of lighting to meet security requirements with the ability to increase lighting levels when motion is detected such as the movement of a car or truck.

15.4 MITIGATION MEASURES

Visual

Landscaping of the Project should be undertaken generally in accordance with the Landscape Masterplan prepared for the Project.

Lighting

In addition to design and maintenance of the proposed lighting system to ensure both effective lighting that meets the requirements of AS4282: Control of Obtrusive effects of Outdoor Lighting, a management plan has been proposed, this should incorporate the measures below contained in Table 63 below:

Table 63 Lighting Management Plan (Source: WEBB Australia)

IMPACT	PROPOSED MANAGEMENT METHOD	MONITORING	TIMING
Unnecessary luminaries, Increase energy consumption and GHG emissions	When not in use, lighting deemed not essential to personnel safety is to be switched off automatically	Site manager to undertake regular site inspections to ensure all unnecessary lighting is switched off.	Annually and on going
	Motion detector to be installed where required to witch groups of luminaries	Not applicable	Implemented during construction
	Inspect output levels in guidance to Australian Standard maintenance levels	A qualified electrician to ensure replacement luminaries / lamps are correctly installed and operating within the required guidelines	Ongoing and as required
	Install electronic control gear on luminaries	Not applicable	Implemented during construction
Adverse behavioural changes to nocturnal fauna and habitat	Decrease luminance and lumiance to minimum safe operating levels	Site manager to undertake regular site inspections	Ongoing and as required
	Where feasible, lower mounting height of luminaries at sensitive locations	Not applicable	Implemented during construction
	Minimise light spill	Not applicable	Implemented during construction
	Install light shield at sensitive locations	Not applicable	Initially implemented during construction, post construction as required

IMPACT	PROPOSED MANAGEMENT METHOD	MONITORING	TIMING
	All migratory avifauna sightings to be reported to the site manager	Not applicable	As required
	Light spill to be recorded at sensitive receptors	Site manager to undertake regular site inspections	Initially implemented during construction, post construction as required

15.5 CONCLUSION

The Project would result in some impacts on the existing surrounding environment in terms of landscape and scenic values. The visual impacts would vary depending on the viewing location. Any visual impact would result from the removal of existing vegetation and construction of buildings and associated rail infrastructure. It is unlikely that the Project would result in a significant visual impact due to both the distance of the Project to the viewpoints as well as the change in site levels. Lighting of the Project is not expected to result in a significant impact. WEBB Australia, through their assessment, has demonstrated that a Lighting design can be provided on site that meets AS4282: Control of Obtrusive Effects of Outdoor Lighting, a management plan has been proposed. The design proposed will minimise energy consumption, has minimised light spill into both residential and bushland areas, reduced glare and provided maintenance and monitoring recommendations to ensure that this can be managed in the long term.

16 OTHER ENVIRONMENTAL CONSIDERATIONS

16.1 INTRODUCTION

This chapter provides an assessment of other environmental considerations relevant to the project. These environmental considerations were identified during the environmental risk process and as a result of preliminary investigations. They are not considered to be key issues to the Project, however, have been included to provide a comprehensive assessment of all potential impacts of the Project. This chapter provides and assessment of:-

- Land Use.
- Waste Management.
- Flooding and Hydrology.
- Drainage and Water Quality.
- Climate Change and Sustainability.

16.2 LAND USE

As discussed in Section 2, The Project is sited wholly within Lot 1 in DP 1129191 to the south of the existing township of Greta in the Hunter Valley. The site is currently vacant and has been previously used for both mining and agricultural uses. The surrounding land uses of the site are detailed in Table 40 (in Section 10.2). As detailed in this table, the surrounding land uses are predominantly residential and rural. The site is bounded by the Main Northern Railway to the east, and the proposed Hunter Expressway to the west.

The Project would result in a land use change for the site from vacant land to infrastructure. This would result in a physical change to the current site activities. The land use changes would generally be limited to the site only, no property acquisition would occur as a result of the Project. The only works outside the property boundary would be connection to the Main Northern Railway. ARTC have been consulted in regard to these proposed access arrangements.

The locality is likely to undergo significant change and intensification of land use following completion of the proposed third track on the Main Northern Railway and the Hunter Expressway.

In the context of these two infrastructure Projects, the proposed land use change on the site is considered minor. There would be no changes to existing land use or access arrangements to either adjoining or other properties in the locality as a result of the Project. The adjoining properties to the south would continue to gain access off Mansfield Street. The implementation of the mitigation measures discussed throughout this report would allow the land use change on site to be managed in accordance with the relevant requirements, and with minimal impact.

Overall, land use impacts as a result of the Project are not considered to be significant, and no specific mitigation measures are required.

16.3 **WASTE MANAGEMENT**

Waste would be generated as a result of the Project both during construction and operation, as detailed below.

16.3.1 **CONSTRUCTION**

During construction of the facility, waste materials would be generated and would need to be disposed of, these waste streams include:-

- Excavated material from bulk earthworks, including soils and some rock.
- Vegetation from clearing activities.
- Excess construction materials, such as concrete, steel and timber, as well as packaging materials for products used on site including wrapping materials and plastics.
- Liquid wastes from plant and machinery maintenance including fuels, oils and chemicals.
- Wastewater from dust suppression activities.
- Sewage generated at amenity facilities at the construction compound.

- General rubbish and recyclables.

The Preliminary Contamination Report (Douglas Partners, 2009) identified some waste present at the site which would need to be removed. This generally comprises building materials and rubbish. It was recommended that these materials be investigated during construction to assess their suitability to remain on site.

Operation

Some waste would be generated as a result of operations, although this is expected to be minimal. Based on the current Pacific National operations at Port Waratah and Kooragang, the following waste streams and quantities are expected to be generated as a result of the Project:

Table 64 Operational Waste Details

WASTE STREAM	METHOD OF REMOVAL	FREQUENCY
Liquid Waste (oily water containing diesel, oil, sludge etc)	Truck	2 per month
Sand (from provisioning activities)	Truck	2 per month
General Rubbish (skip bins)	Truck	2 per week
Recyclables (paper etc from office activities)	Truck	1 per week
Scrap Metal/Steel	Recycled	1-2 per month
Wagon Maintenance Waste	Recycled/Re-used	1-2 per month
Green Waste	Re-used on site as mulch/composting	N/A

Where possible, waste generated on-site would be reused on-site, or recycled at an off-site location. Once the facility is operational, Pacific National would be able to employ the waste management strategies they have developed in their current business to effectively and efficiently manage wastes such as oil and used parts. This would include the preparation of a WMP for the Project which would detail the waste management strategies to be employed on site.

Detailed investigations are currently being undertaken regarding the disposal of waste water and sewage from the site.

16.3.2 MITIGATION MEASURES

To encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development, waste materials generated during construction and operation of the Project would be considered against a hierarchy of the following order: avoidance of unnecessary resource consumption, resource recovery (including reuse, reprocessing, recycling and energy recovery), and disposal. This is consistent with the principles of the waste management hierarchy referred to in the *Waste Avoidance and Resource Recovery Act 2001* and the NSW Government's *Waste Reduction and Purchasing Policy 1997*. The provisions of the waste management measures contained in the POEO Act would also be met on site, including classification and management.

In order to meet these requirements, a detailed Waste Management Plan (WMP) would be prepared for both construction and operation. The WMP would contain detailed management measures. Waste material on site would be sorted and where possible, recycled to minimise delivery of construction materials to landfill. The following general measures would be included within the WMP:

- Excavated material would, wherever possible, be reused on site. The excess cut material would require off-site disposal.
- Topsoil would be re-used in re-vegetation of cleared areas and where practical, vegetative matter (excluding weeds) would be chipped and reused as mulch on site. Logs and tree limbs suitable for habitat and or fauna refuge would be collected during clearing and placed in an area of the site to be re-vegetated.
- Where possible, waste materials would be recycled and/or reused on site. If this is not possible, they would be transported to an approved recycling or waste management facility, as appropriate.
- Waste bins, including recycling bins, would be provided throughout the construction site, and in designated areas during operation.

- During operation and construction, waste would be transported from the site when storage facilities are filled. The waste storage area would be kept tidy and well maintained.
- Liquid waste such as chemicals, fuel and lubricants, and their containers, would be disposed of in accordance with the relevant requirements.
- During construction, portable toilet facilities would be installed on site and emptied periodically by an approved contractor.

16.4 FLOODING AND HYDROLOGY

16.4.1 FLOODING

A preliminary HEC RAS flood model was prepared by Sinclair Knight Merz in relation to the existing water courses that affect the site. In particular, the water course at the southern end of the site known as Sawyers Creek which is a tributary of Anvil Creek. The modelling determined that flooding was unlikely to be a significant issue on the site.

The site is affected by three catchments the most significant of which is the Sawyers Creek catchment, which is approximately 4.9 square kilometres. The remaining three catchments which extend well beyond the site, but include parts of the northern end of Pacific National land are .33 square kilometres, .57 square kilometres and 2.1 square kilometres. However, of the final catchment, only about 2 hectares of this catchment lies within the site boundary.

The catchments have been considered two separate groups, first the Sawyers Creek catchment, which is the largest catchment, and the remaining smaller catchment has been considered as a single group.

The Sawyers Creek catchment has as its primary influences on flooding as:-

- The capacity at the creek channel based on its geometry and the type of vegetation lining the creek banks and low gradient of approximately 1% of the watercourse within the site.
- The bridge crossing underneath the main northern railway line which provides a culvert for the escape of water and the capacity for this crossing to be affected by blockages.
- Backwater impacts from Anvil Creek should flooding occur in this area.
- Should a very large flood occur in the area, the main northern railway line will act as a flood control.

The local catchments will predominantly be affected by:-

- Filling of the site to achieve the grades required for the train access.
- Clearing and change of land use.

The access road to the site would need to cross Sawyers Creek.

Assessment of Potential Impact

These potential drainage impacts will require on-site drainage to be designed to manage stormwater flows to ensure that any ponding on-site can be controlled on the Pacific National site. On site drainage is discussed in Section 16.5 below.

In extreme flood events, Sinclair Knight Merz believes that evacuation planning is not considered to be a significant issue of the site, due to the site rising to the west and the likelihood that if the site was evacuated, local roads in the Greta area would likely be inundated and would restrict the movement of people leaving the site.

The elements of construction which are most likely to impact on the stormwater events in relation to flooding on the site:-

- The construction of a third rail and how stormwater will be directed from Sawyers Creek under the main northern rail.

- The construction of an access road on the Pacific National site to span Sawyers Creek.
- The construction of the extension of the F3 Freeway on the western boundary of the site.

HEC-RAS modelling for the Sawyers Creek catchment before and after the water levels only raised a small amount which would not affect the hydrology in the area. The model also took into account that in a storm there would also be back water flooding from the Anvil Creek. In the 100 year flood event there would be water above the culvert by 0.5 metres however, this would still be below the road surface.

The Project includes three culverts. Currently the preliminary sizing of these culverts are 2 x 900mm RCP. Both of these sit upon minor watercourses while the major culvert of 3 x 2700mm x 2800mm is on Sawyers Creek. The major culvert on Sawyers Creek would be designed in order for it to span the current width between the banks of Sawyers Creek. This is so that it both does not affect the natural flow as much as well as to minimise the earthworks. The culvert length was designed for a length of 18 metres.

In terms of requirements for “Guidelines for Controlled *Activities* (Feb 2008) - Water Crossings” the major culvert was designed to be a very similar opening to the existing channel. This would ensure minimal disturbance to the natural flow. The bottom level of the culvert was designed so that it could also sit 200mm below the ground level and hence let there be 200mm on natural material at the bottom of the culvert this with the fact that it is only 18 metres long would provide a passage for fish to travel upstream and downstream. Scour protection would be provided on all the culverts. With these considerations it can be seen that the culverts would be able to minimise its effect on the existing natural watercourse and would meet the Guidelines for Controlled *Activities* - Water Crossings”.

Mitigation Measures

Each of the items discussed above will need to be considered once their design is better understood and their impact can be assessed in relation to drainage and flooding on the site. A concept drainage plan has been prepared for the Project and submitted with the EA which considers these items. These items would also be considered during detailed design for the Project.

The bridge to be constructed over Sawyers Creek would be designed and constructed to withstand the effects of flooding, and be above the 1 in 100 year flood event for the site.

Groundwater

Sub-surface investigation was undertaken by Douglas Partners who drilled four boreholes. A summary of groundwater levels encountered in the four bores is presented in **Table 65** below.

Table 65 Groundwater Levels on Site (Measured 18 August 2009).

BORE	DEPTH TO WATER (M)	GROUNDWATER LEVEL (AHD)
1	23.5	43.7
2	14.5	42.4
3	15.8	43.6
4	10.4	43.4

A records search of registered groundwater wells indicated that the nearest registered well (GW080479) to the site is located approximately 500 metres west of the site's southern boundary. The next closest registered groundwater well (GW080478) is located approximately 800 metres to the south west of the site.

There were no registered wells between the site and Anvil Creek to the east.

Assessment of Potential Impact

The potential groundwater impacts that may occur include:-

- A reduction in groundwater available to existing users.
- Long term changes to the groundwater flow regime.
- Groundwater dependent ecosystems.
- Groundwater quality impacts.

The Project has the potential to affect groundwater via migration of contamination from the following sources:-

- Fuel storage and associated fuel leaks, spillage.

- Chemical storage.
- Wastewater systems/management (e.g. sumps, oil water separators).
- Solid and liquid waste handling/storage.

The Project would be designed in accordance with the relevant environmental regulations which would ensure that sufficient safeguards are put in place to minimise the migration of contamination and consequently, potential to impact groundwater quality at the site.

Groundwater could also be impacted if mine rectification works are undertaken at the site. All buildings on site would be located over mine workings with greater than 40 metres cover. Mine rectification works would not be required for these structures.

Part of the access road and rail tracks would be located over mine workings with less than 40 metres cover. Mine rectification works may be required for these structures. Where these works are undertaken, the injection of grout could cause displacement of groundwater and result in localised impacts on the groundwater flow regime. The mine water would not be suitable for discharge to the existing creek system and would need to be disposed of or treated.

The groundwater data presented in Table 65 above, suggests that regional groundwater is at considerable depth. In addition, the low permeability of the overlying strata will restrict migration of surface impacts to the underlying groundwater table.

The Project would be designed in accordance with the relevant environmental requirements, and the controls required by current regulations would allow early detection and cleanup of any spills/leaks. This would minimise the risk for adverse impact on groundwater quality. In addition, if groundwater was displaced during construction as a result of mine rectification works, it could be easily managed, as discussed below. Overall, the Project is considered to have a low potential for impact on groundwater at the site.

Mitigation Measures

- The Project should be designed to meet the relevant environmental standards for bunded chemical/fuel storage facilities, regular monitoring and leak detection systems, waste management procedures, etc. to minimise the potential of the Project to impact on groundwater quality.
- In the event that groundwater (mine waters) is brought to the surface through grouting, it should be managed via re-use on site in the grouting process, re-injection to the mine or appropriate treatment and disposal.

16.5 DRAINAGE AND WATER QUALITY

Worley Parsons prepared a *Surface Water Management Assessment* for the Project (Refer to Appendix O). The site is within the Anvil Creek, Whitburn drain and Redhouse Creek catchment. The Project has the potential to impact on the catchment if not managed properly. The development would result in a changed catchment and create different surfaces and uses which would affect the quality and quantity of stormwater when compared to post development flows. Stormwater would be treated to manage both water quantity and quality leaving the site, as discussed above. The use of gross pollutant traps, swales and detention and settling ponds will provide opportunities to manage flows from the site.

A number of small farm dams exists throughout the site as well as four ephemeral watercourses that traverse the site. The largest watercourse is Sawyers Creek, which traverses through the southern portion of the site. Sawyers Creek has a contributing catchment area of approximately 5kms that extends approximately 6kms to the south of the site, to the Molly Morgan Mountain Range.

Sawyers Creek is classified as a second order watercourse using the Strahler System of ordering watercourses. Two unnamed smaller first order watercourses and one unnamed second order watercourse traverse the site to the north of Sawyers Creek.

All four on-site watercourses are tributaries to Anvil Creek, which has a catchment area of 3,653ha. The Anvil Creek catchment is characterised by undulating and flat terrain with slopes ranging from 0 to 10%. Rural land-uses dominate the catchment, with pasture/grazing/cropping making up 48% of the total area.

In addition, there are small areas of intensive agriculture. Approximately 40% of the catchment is currently forested and 12% is occupied by urban settlement. There are numerous remnant mining operations located through the catchment (*Cessnock City Wide Settlement Strategy, 2003*). The Cessnock City Wide Settlement Strategy describes Anvil Creek has relatively degraded when compared to other, less developed, catchments in the Cessnock City Council LGA. Anvil Creek joins Black Creek downstream of the Township of Branxton. Black Creek is a major tributary of the Hunter River.

A desktop search was undertaken to collate publicly available water quality data from both Anvil and Black Creeks. The water quality observations sourced indicate that the local water quality in Black and Anvil Creeks significantly exceeds the Australia and New Zealand Environment and Conservation Council (ANZECC) default trigger values for salinity. In addition, the observed salinity levels are significantly higher than the median value of 670 $\mu\text{S/cm}$ reported in the Hunter River at Greta (*Department of Land and Water Conservation, 2003*). Both observed Total Nitrogen and Total Phosphorus water quality trends were also substantially higher than the ANZECC default trigger values. The available data indicates that the water quality in both Anvil and Black Creeks is degraded. This hypothesis is supported by the Cessnock City Council's City Wide Settlement Strategy which describes the water quality in both Anvil and Black Creek Catchments as being 'very highly saline' and degraded (*Cessnock City Council, 2003*).

16.5.1 ASSESSMENT OF POTENTIAL IMPACT

The following water quality contamination processes and pathways have been identified as potentially occurring during the construction and operational phases of the Project.

Construction Phase: The construction of the Project is to involve significant earthworks to achieve the proposed site grading. As a result of the soil disturbances, there is potential for temporary increases in sediment loads to occur in run-off from the site.

During construction, sediment and erosion control measures would be designed and installed in accordance with the NSW Department of Housing "*Managing Urban Stormwater – Soils and Construction*" (*Blue Book*). A detailed soil and water management plan will be prepared at the detailed design stage of each construction stage.

Operation Phase: During operational stage of the Project, the following potential contaminant sources have been identified:-

- Locomotive Wash Facility: Locomotives would be washed in a designated facility. Run-off from this washing process is likely to comprise poor water quality, with elevated concentrations of oil and grease, heavy metals, nutrients and Chemical Oxygen Demand (COD). All wash-down water would be treated on-site to a suitable quality required for disposal under a trade waste agreement.
- Work Shops and Provisioning Shed: Internal run-off from the on-site workshops and the provisioning shed is likely to contain similar water quality to run-off from the locomotive wash facility. As such, all internal run-off would be treated on-site to a suitable quality required for disposal under a trade waste agreement.
- Rail Yard and Maintenance Areas: It is likely that the rail sidings would generate a low to moderate particulate load (*comprising coal and non coal particulates*). Coal particulates can contain soluble salts and acid forming materials. However, as no handling of coal would be undertaken on-site, the coal particulate load is expected to be low (*primarily through coal falling from wagons*) and no significant acid or salinity issues are expected. There is also potential for low to moderate levels of hydrocarbon and heavy metal contamination resulting from machinery operations. All surface run-off from the rail yard would be treated in Water Quality Control Ponds (WQCPs) designed to remove suspended sediments and low to moderate levels of heavy metals and oil and grease prior to discharge. The oil and grease loads are expected to be higher in run-off from the key infrastructure and maintenance area (*defined as the area between the Administration Building and the fuel storage area*).

As such, a Gross Pollutant Trap (GPT) with hydrocarbon removal capabilities will pre-treat run-off from this area prior to treatment in the WQCPs.

- Accidental Spills: The rail yard operations would involve the handling of large volumes of liquids such as diesel fuel, oil, radiator fluid and hydraulic fluid. As with any industrial operation, there is potential for an accidental spill or leakage to occur. In addition, spills may occur from machinery failure.

While management measures will be implemented to reduce the probability of an accidental spill occurring, contingency measures will also be implemented to enable any spill to be contained on-site and be effectively remediated.

A Surface Water Management Plan (SWMP) has been prepared, and would be implemented for the Project. The SWMP incorporates a range of preventative, treatment and contingency measures for the Project. Preventative measures are included as they are the most effective stormwater management methods as they control the source of any surface water management issues. These measures include: isolation of the clean water drainage, isolation of highly polluting areas, operational procedures and stabilisation of exposed soils.

A rainwater harvesting scheme should be implemented to supplement the on-site non-potable water requirements for both toilet flushing and locomotive washing. **Table 66** details the four rainwater harvesting schemes proposed for the Project as well as tank size required, average harvested volume and harvesting efficiency. Results analysis indicates that the water quality criteria detailed in The NSW Government Guideline titled *Managing Urban Stormwater – Harvesting and Reuse* (DECC, 2006) could be achieved by using a pressurised filtration unit followed by chlorine dosing.

Table 66 Water Balancing Results

HARVESTING SCHEME	DESCRIPTION	TANK SIZE (KL)	AVERAGE HARVESTED VOLUME (KL/YR)	HARVESTING EFFICIENCY (% OF TOTAL DEMAND)
Scheme A	Harvests runoff from the Administration building for internal re-use for toilet flushing	20	100	85%
Scheme B	Harvests runoff from the Wheel Lathe facility for internal re-use for toilet flushing.	5	18	97%
Scheme C	Harvests runoff from the Provisioning Shed for internal re-use for toilet flushing.	30	225	81%
Scheme D	Harvests runoff from the Locomotive Maintenance Shed, Road Vehicle Centre, Wagon Maintenance Shed and the Locomotive Wash Facility.	60	615	51%

	Harvested water will be reused for toilet flushing in each building as well as supplement the water requirements for the Locomotive Wash Facility.			
Total		115	958	59%

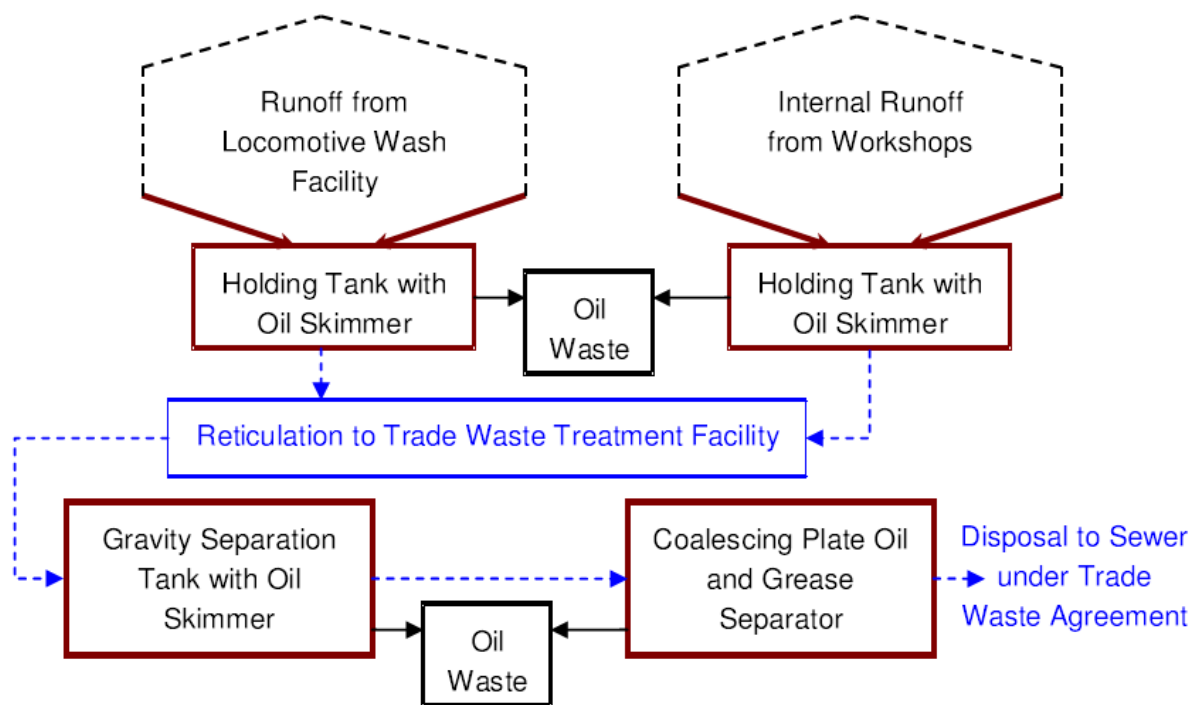
All surface run-off from the Project would be treated in one of five Water Quality Control Ponds (WQCPs) on site prior to discharge. WQCPs were selected as the preferred water quality treatment method as they are suited to flat sites and facilitate relative ease of maintenance. WQCPs are effective in removing sediment, nutrients and other pollutants such as oils and greases and heavy metals from run-off through a range of physical, biological and chemical processes. The WQCPs are designed to achieve an 80% reduction in suspended sediment levels and remove low to moderate concentrations of heavy metals and oils and greases. A two stage treatment process incorporating an inlet pond and macrophyte zone would be implemented. Outlet control in the form of a grated outlet pit would also be construed to control outflow from the WQCP. A MUSIC water quality model was used to determine the key design parameters of each of the proposed WQCPs. These parameters would be applied at detailed design stage.

Trade waste generated from the locomotive wash facility and various workshops on site also has the potential to impact on water quality.

Run-off from these facilities is expected to contain elevated levels of oils and greases, suspended solids, heavy metals, nutrients and chemical oxygen demand. The collective volume of trade waste generated on-site would be approximately 4KL/day. Preventative treatment measures would be implemented to maintain an acceptable trade waste quality. All liquid wastes such as radiator fluid, engine oil and hydraulic fluid will be collected, stored and disposed of in a separate liquid waste stream. All workshop and wash-down areas will be covered within a building to prevent any rainfall entering into the trade waste system. External drainage will be provided to prevent any stormwater flowing into the trade waste system.

Trade waste would be treated on site using a two stage treatment process, comprising a gravity separation tank and a coalescing plate separator, as detailed below in **Figure 50**- Pacific National intend to negotiate a trade waste agreement with Hunter Water Corporation, if an agreement cannot be reached, all trade waste will be disposed of as liquid waste to an appropriate disposal facility for treatment.

Figure 50 trade Waste Process Diagram (Source: Worley Parsons)



Riparian corridors would be treated on site through the provision of a core riparian zone and a vegetated buffer. This approach is consistent with DECCW's *Guideline for Controlled Activities: Riparian Corridors*. A controlled activity approval was obtained for site investigation works. A number of mitigation measures have been included to help manage riparian vegetation on site.

It is proposed to decommission all existing farm dams within the site. As discussed above, it is proposed to construct five WQCPs for the sole purpose of stormwater quality treatment. As these wetlands are intended for capture, containment and treatment of run-off, they are considered to be exempt from harvestable rights calculations. It is not proposed to extract water from any of the WQCPs.

These measures would reduce the potential of the Project to impact on Water Quality. Water quality modelling undertaken indicates that the development proposal would result in the average annual surface run-off increasing from approximately 16 ML/year to 48 ML/year.

This increase in flow is unlikely to adversely impact the hydrologic regime in Anvil Creek and downstream receiving waters. A Water Quality Monitoring Plan would be developed to monitor the effectiveness of this the water quality treatment. Re-use of harvested stormwater for toilet flushing is considered to be secondary contract and no treatment is required other than a first-flush diversion.

16.5.2 MITIGATION MEASURES

Construction

- Erosion and Sediment Control measures will be required to minimise the occurrence of sediment being exported from the site. An Erosion and Sediment Control Plan should be designed and installed in accordance with the NSW Department of Housing “*Managing Urban Stormwater – Soils and Construction*” (Blue Book).
- The contractor must clearly mark on the ground, the boundaries of the area of the crossing of Sawyers Creek prior to the commencement of any works and maintain those markings until the works are complete, in order to maintain and protect vegetation growing along the toe and face of the riverbank outside of the area of works.
- The contractor must relocate any unused or excess materials at least 20 metres from the river and/or outside the designated riparian corridor.
- The contractor must not put materials in the drainage line or river or in any area that has existing native vegetation and/or that is identified as part of the riparian corridor.
- The contractor must use only biodegradable materials for any only erosion control matting within the riparian corridor.

- The contractor must not use wire mesh structures, concrete, spray concrete, concrete grouting, crib walling or car types for bank stabilisation.

Operation

- A concept drainage plan has been prepared for the Project and submitted with the EA. The detailed drainage design for the Project would be based on this concept design.
- A Surface Water Management Plan (SWMP) has been prepared for the Project and should be implemented. The SWMP incorporates a range of preventative, treatment and contingency measures for the Project.
- A Rainwater Harvesting Scheme should be implemented to supplement the on-site non-potable water requirements for both toilet flushing and locomotive washing. This should incorporate:-
 - Rainwater will be harvested from the roofs of all on-site buildings.
 - Harvested rainwater from the Administration building, Wheel Lathe facility and the Provisioning Shed will be re-used for toilet flushing in each respective building.
 - Harvested rainwater from the Locomotive, Road Vehicle and Wagon Maintenance Sheds and the Locomotive Wash Facility will be reused for toilet flushing in each building as well as to supplement the water requirements for the Locomotive Wash Facility.
- Run-off from the infrastructure and maintenance area shall be pre-treated in a Gross Pollutant Trap with oil and grease removal capabilities prior to treatment in the Water Quality Control Ponds (WQCPs).
- All surface run-off from the Project will be treated in WQCPs prior to discharge. The WQCPs shall be designed to achieve an 80% reduction in suspended sediment levels and remove low to moderate concentrations of heavy metals and oils and greases.

- A Maintenance Plan should be development for the WQCPs and Rainwater Harvesting Scheme.
- All water generated from the locomotive wash facility and from internal water use in workshops will be reticulated to an on-site treatment plant. The treatment plant will comprise a gravity separation tank and a coalescing plate separator. The plant will be designed to treat the trade waste to a suitable quality for disposal under a trade waste agreement with Hunter Water Corporation.
- A monitoring program should be implemented for an initial two year period of operation. Following this period, the monitoring plan should be reviewed in liaison with the relevant government authority. The following mean concentrations for each analyte included shall be used as the proposed benchmark.

Table 67 Water Quality Monitoring Benchmark

ANALYTES	MEAN CONCENTRATION
pH	6.5 to 8.0 [^]
EC	670 μ s/cm ^{^^}
Total Suspended Solids	25 mg/l ^{^^^}
Key Metals (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg, Co, Be, Ba, Mn, Mo, Se, SN, Ag, B)	ANZECC Guideline Trigger values for 80% level of protection for freshwater Species
Total Oil and Grease	10 mg/l ^{^^^}

If water quality trends exceed the benchmark concentrations presented above, the following contingency measures should be implemented:-

- Increased monitoring frequency and sampling points to identify and confirm the source of any suspected degradation to water quality.

- Review the SWMP in order to identify opportunities to improve or rectify any identified problem. The data collected as part of the monitoring program will enable fully informed decisions to be made. Potential measures that could be implemented are:-
 - Applying a flocculating agent into the inlet pond to enhance the sedimentation rate.
 - If oil and grease concentrations are higher than expected, an oil and grease separator could be installed between the inlet pond and macrophyte zone of the WQCPs.
 - Adjust operation procedures to eliminate the source of any identified problem.
 - If any component of the surface water management framework is identified as creating an unacceptable environmental impact, remedial actions will be established in close liaison with the relevant authority.
- In the event a spill on site occurs the following measures would be implemented:-
 - If possible, the spill will be contained at the spill location and remediated using a spill kit. This may not be achievable in the rail yard areas as any liquid spill will quickly permeate into the ballast.
 - If a spill does enter into the drainage system, the drainage system will be sealed (*with sandbags and an impermeable liner*) at either an access pit or the pipe outlet. Flushing may be required to wash any contamination through the drainage system. All collected liquid will be pumped from the piped drainage into the trade waste holding tank.

Testing would be undertaken to identify the chemical properties of the spill and determine the most suitable treatment and disposal option. If the spilled material comprises fuel or oil, the collected liquid could be treated in the on-site trade waste treatment facility and disposed under the trade waste agreement.

If the spill contains chemicals that are not suitable for discharge under the trade waste agreement, then contaminated liquid would be transported to an appropriate off-site liquid waste disposal facility.

- Any contamination entering the WQCPs would be contained in the inlet pond, which will only be hydraulically connected to the macrophyte zone during wet weather periods. If this occurs, the contained water in the inlet pond will be remediated. Depending on the nature of the contamination and the water volume, specialised equipment may be required.

CONCLUSION

It is considered that with the adoption of the above mitigation measures, the Project is unlikely to adversely impact the water quality in Anvil Creek and downstream receiving waters.

16.6 CLIMATE CHANGE AND SUSTAINABILITY

Scientific consensus and government policy indicates that thermal balance is being influenced by the steadily increasing concentrations of certain greenhouse gases including carbon dioxide (CO₂), and other greenhouse gases such as methane, ozone (O₃), NO_x and Chloro-fluorocarbons (CFCs). This process is known as climate change.

The Project would result in the generation of some greenhouse gases during the construction and operation phases. In particular the use of machinery during the construction phase, and train movements during the operation phase would require fuel and therefore, result in some greenhouse gas emissions. Additionally, activities on site such as lighting would require electricity and would result in some consumption.

These emissions are considered minor in nature and unlikely to result in a significant impact. Where possible, works would be undertaken on site to minimise greenhouse gas emissions through both technological and environmental controls.

Pacific National has a Greenhouse Gas Management policy which minimises fuel and energy consumption. The Key features of this policy are:-

- The development of an emission profile/auditing energy use and waste.

- Minimisation of energy consumption (including the implementation of fuel miser/saving strategies and the use of fuel additives and fuel alternatives).
- Monitoring of energy consumption (including data collection and reporting).
- Training staff to enhance awareness of the need to minimise greenhouse gas emissions and how to minimise those emissions.
- Monitoring of compliance and regularly reviewing policies to determine whether objectives are being met.

Further, it is important to note the Project itself does not generate demand for additional train movements. The Project will service and provision trains currently owned by Pacific National and any additions to their fleet.

Notwithstanding that the Project is likely to have a minor impact on climate change, the concept design for the Project has been designed so that buildings and structures on site minimise their environmental impact.

This would be further refined during the detailed design phase. A sustainability consultant was employed during development of the concept design to undertake an assessment of sustainability opportunities for the Project. A number of recommendations were identified which would be incorporated into the detailed design for the Project. It is noted that many of these recommendations are also consistent with those discussed in other Sections of this report, including those relating to Waste Management (Section 16.3), groundwater (Section 16.4), biodiversity (Section 7), Heritage (Section 11) and Transport (Section 8).

17 ENVIRONMENTAL RISK ANALYSIS

17.1 INTRODUCTION

The DGR's for the Environmental Assessment require that an Environmental Risk Analysis (ERA) is undertaken for the Project. The ERA is a process designed to identify potential environmental impacts associated with the Project (construction and operation), proposed mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. The Director-General's Requirements specify that *where additional key environmental impacts are identified through this environmental risk analysis, an appropriately detailed impact assessment of this additional key environmental impact must be included in the Environmental Assessment.*

17.2 APPROACH

The steps undertaken to identify the environmental issues relevant to the Project included a review of relevant legislation, policies and guidelines (refer to Section 5) in addition to consultation with the community, government authorities and key stakeholders (refer to Section 6). This process identified the following potential environmental issue categories for the Project. Specific Risks for each category are contained in **Table 72** (Section 17.3) and **Table 73** (Section 17.4).

Table 68 Environmental Issues Identified for the Project

Ecology	Social and Economic	Noise and Vibration
Traffic and Access	Soils and Contamination	Hazards and Risks
Heritage	Drainage and Water Quality	Visual Impact
Air Quality	Waste Management	Flooding and Hydrology

An ERA was undertaken using the methodology described below to determine the significance of impacts associated with each environmental issue identified above. An ERA was conducted generally upon the methodology outlined in Standards Australia's document *Environmental Risk Management – Principles and Processes* and *Australian Standard AS/NZ 4360 Risk Management*.

The analysis categorised levels of risk for a given event based on the significance of effects and the manageability of effects. The measures of probability categories and the measures of consequences categories as well as the risk ranking matrix are detailed in the following tables.

Table 69 Measures of Probability Categories for ERA undertaken

RANK	PROBABILITY	DESCRIPTION
A	Almost Certain	Happens often and is expected to occur
B	Likely	Could easily happen and would probably occur
C	Possible	Could happen and has occurred elsewhere
D	Unlikely	Unlikely to happen but may occur
E	Rare	Could happen, but only in extreme circumstances

Table 70 Measures of Consequence Categories for ERA undertaken

RANK	CONSEQUENCE	DESCRIPTION
1	Extreme	Permanent and catastrophic impacts on the environment; Large impact area; Reportable incident to external agency; Large fines and prosecution; Operational Constraints; Substantial community concern.
2	Major	Permanent and detrimental impacts on the environment; Large impact area; Reportable incident to external agency; May result in large fines and prosecution; Operational constraints; high level of community concern.
3	Moderate	Substantial temporary or minor long term detrimental impacts on the environment; moderate impact area; Reportable incident to external agency; Action required by reportable agency; community interested.
4	Minor	Minor detrimental impacts on the environment; small impact area; Reportable incident internally; No operational constraints; some local community interest.
5	Low	Nil or temporary impacts on the environment; small or isolated impact area; Not reportable incident; No operational constraints; uncontroversial project no community interest.

Table 71 Risk Matrix for ERA undertaken

		CONSEQUENCES				
		1 Extreme	2 Major	3 Moderate	4 Minor	5 Low
Probability	A (Almost Certain)	E	E	E	H	H
	B (Likely)	E	E	H	H	M
	C (Possible)	E	E	H	M	L
	D (Unlikely)	E	H	M	L	L
	E (Rare)	H	H	M	L	L

17.3 ANALYSIS - UNMITIGATED RISKS

The following table details the unmitigated risk sources and risks of potential environmental impacts of the Project.

Table 72 Unmitigated Risk Sources and Potential Environmental Impacts of the Project

ISSUE	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	PROB.	CONS.	RISK
Ecology	Removal of Native Vegetation as a result of land clearing	Loss of existing vegetation communities. Loss of biodiversity.	B	3	H
	Disturbance to habitat as a result of land clearing	Loss of existing habitat for threatened fauna. Loss of biodiversity.	B	3	H
	Disturbance to habitat as a result of operation e.g. contaminated water, dust, noise etc	Detrimental potential impact to flora and fauna species, populations or communities. Impacts on biodiversity.	C	3	H
Traffic and Access	Temporary closure or network restriction during construction	Restriction to other properties in Mansfield Street, delayed journeys, detours.	D	4	L
	Increased traffic level on the network due to traffic movements during construction and operation	Increased traffic congestion, elevated risk of incidents and accidents, pavement deterioration, intersection delays.	B	3	H

ISSUE	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	PROB.	CONS.	RISK
Social and Economic	Changes in local employment	Improved economic activity and job prospects. Increased employment. Improved economic activity.	N/A - Positive Impact		
	Reduced property value of adjoining properties	Reduced individual assets	D	3	M
	Stimulation of local economy	Improved economic activity.	N/A - Positive Impact		
	Impacts on amenity of neighbouring properties	Actual or perceived reduced quality of life	D	3	M
Soils and Contamination	Reduction in soil quality as a result of earthworks, stripping and stockpiling	Erosion, reduced soil capability, reduced soil stability	B	3	H
	Potential erosion from exposed soils and sediments and material stockpiles caused by poor practices	Erosion, reduced soil capability, reduced soil stability, increased sediment in nearby watercourse	B	3	H
	Disturbance of contaminated lands	Health and contamination risk	C	3	H
Noise and Vibration	Increased noise levels as a result of construction and operational activities	Amenity impacts including sleep disturbance. General disturbance.	B	3	H
	Vibration to surrounding properties during construction including rock hammering/piling	Structural damage to buildings	D	4	L
Hazards and Risks	Increased bushfire risk	Risk to nearby buildings and structures	D	3	M
	Potential spills of fuels, greases and other chemicals from inadequate storage, handling and disposal procedures	Contamination of land and nearby watercourse. Potential explosions and fires.	C	3	H

ISSUE	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	PROB.	CONS.	RISK
	Potential mine subsidence on the site	Damage to buildings and site	D	3	M
Heritage	Removal/destruction of Indigenous sites or objects	Impact on Indigenous cultural heritage	C	3	H
	Removal/destruction or impact to non-Indigenous buildings or structures	Impact on non-Indigenous cultural heritage	D	4	L
Visual Amenity	Changes in visual characteristics of the Site	Decreased visual amenity for nearby residents. Disruption of view corridors.	C	4	M
	Lighting of night time activities	Amenity impacts on nearby residents due to glare/lighting spill	C	4	M
Air Quality	Dust emissions from construction activities	Amenity impacts. Potential health risks.	C	3	H
	Greenhouse gas emissions from vehicle and train movements associated with the facility	Contribution to global greenhouse emissions	C	4	M
	Emissions of odours, noxious gases etc.	Amenity impacts. Potential health risks.	C	3	H
Drainage and Water Quality	Discharge of dirty or contaminated water to watercourses	Reduced water quality and downstream impacts	D	3	M
	Sedimentation of Sawyers Creek as a result of poor soil management measures	Increased turbidity, impacts on flow, impacts on biodiversity, downstream impacts	D	3	M
	Pollution of groundwater	Reduced groundwater quality, impacts on ecosystems at discharge point	D	4	L
Flooding and Hydrolog	Restriction of access due to flooding of Sawyers Creek	Employees unable to exit the site	E	4	L

ISSUE	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	PROB.	CONS.	RISK
	Interception of groundwater	A reduction in groundwater available to existing users, Long term changes to the groundwater flow regime, impacts to groundwater dependent ecosystems, groundwater quality impacts.	D	4	L
Waste Management	Improper management of wastes generated on site including excavated material, vegetation, excess construction waste, human waste, general garbage etc.	Potential contamination and erosion impacts. Potential impact on flora and fauna.	D	4	L

17.4 ANALYSIS - RESIDUAL RISK ANALYSIS

Taking into account the Project's concept design, mitigation measures described in Chapters 7-16 and the commitments provided in the draft Statement of Commitments in Section 18, **Table 73** provides an assessment of the mitigated risks associated with the project, or the residual risk analysis. This has been completed for each potential environmental impact identified in **Table 72** based on the likelihood of occurrence and potential environmental consequence.

To ensure validity of results, the same probability and consequence ratings were used for this assessment as were used to analyse the unmitigated risks. For ease of reference the unmitigated risk rating has been included within the table.

Table 73 Mitigated Risk Sources and Potential Environmental Impacts of the Project

ISSUE	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	UNMIT RISK	PROB	CON	MITG RISK
Ecology	Removal of Native Vegetation as a result of land clearing	Loss of existing vegetation communities. Loss of biodiversity.	H	D	3	M
	Disturbance to habitat as a result of land clearing	Loss of existing habitat for threatened fauna. Loss of biodiversity.	H	D	3	M

ISSUE	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	UNMIT RISK	PROB	CON	MITG RISK
	Disturbance to habitat as a result of operation e.g. contaminated water, dust, noise etc	Detrimental potential impact to flora and fauna species, populations or communities. Impacts on biodiversity.	H	D	3	M
Traffic and Access	Temporary closure or network restriction during construction	Restriction to other properties in Mansfield Street, delayed journeys, detours.	L	D	4	L
	Increased traffic level on the network due to traffic movements during construction and operation	Increased traffic congestion, elevated risk of incidents and accidents, pavement deterioration, intersection delays.	H	D	3	M
Social and Economic	Changes in local employment	Improved economic activity and job prospects. Increased employment. Improved economic activity.	N/A - Positive Impact			
	Reduced property value of adjoining properties	Reduced individual assets	M	D	5	L
	Stimulation of local economy	Improved economic activity.	N/A - Positive Impact			
	Impacts on amenity of neighbouring properties	Actual or perceived reduced quality of life	M	D	5	L
Soils and Contamination	Reduction in soil quality as a result of earthworks, stripping and stockpiling	Erosion, reduced soil capability, reduced soil stability	H	D	3	M
	Potential erosion from exposed soils and sediments and material stockpiles caused by poor practices	Erosion, reduced soil capability, reduced soil stability, increased sediment in nearby watercourse	H	D	3	M
	Disturbance of contaminated lands	Health and contamination risk	H	D	4	L
Noise and Vibration	Increased noise levels as a result of construction and operational activities	Amenity impacts including sleep disturbance. General disturbance.	H	D	4	L
	Vibration to surrounding properties during construction including rock hammering/piling	Structural damage to buildings	L	D	4	L

ISSUE	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	UNMIT RISK	PROB	CON	MITG RISK
Hazards and Risks	Increased bushfire risk	Risk to nearby buildings and structures	M	E	4	L
	Potential spills of fuels, greases and other chemicals from inadequate storage, handling and disposal procedures	Contamination of land and nearby watercourse. Potential explosions and fires.	H	D	3	M
	Potential mine subsidence on the site	Damage to buildings and site	M	D	4	L
Heritage	Removal/destruction of Indigenous sites or objects	Impact on Indigenous cultural heritage	H	D	3	M
	Removal/destruction or impact to non-Indigenous buildings or structures	Impact on non-Indigenous cultural heritage	L	D	4	L
Visual Amenity	Changes in visual characteristics of the Site	Decreased visual amenity for nearby residents. Disruption of view corridors.	M	D	4	L
	Lighting of night time activities	Amenity impacts on nearby residents due to glare/lighting spill	M	D	4	L
Air Quality	Dust emissions from construction activities	Amenity impacts. Potential health risks.	H	C	4	M
	Greenhouse gas emissions from vehicle and train movements associated with the facility	Contribution to global greenhouse emissions	M	D	4	L
	Emissions of odours, noxious gases etc.	Amenity impacts. Potential health risks.	H	D	4	L
Drainage and Water Quality	Discharge of dirty or contaminated water to watercourses	Reduced water quality and downstream impacts	M	E	4	L
	Sedimentation of Sawyers Creek as a result of poor soil management measures	Increased turbidity, impacts on flow, impacts on biodiversity, downstream impacts	M	E	4	L
	Pollution of groundwater	Reduced groundwater quality,	L	E	4	L

ISSUE	RISK SOURCE	POTENTIAL ENVIRONMENTAL IMPACT	UNMIT RISK	PROB	CON	MITG RISK
		impacts on ecosystems at discharge point				
Flooding and Hydrology	Restriction of access due to flooding of Sawyers Creek	Employees unable to exit the site	L	E	4	L
	Interception of groundwater	A reduction in groundwater available to existing users, Long term changes to the groundwater flow regime, impacts to groundwater dependent ecosystems, groundwater quality impacts.	L	D	4	L
Waste Management	Improper management of wastes generated on site including excavated material, vegetation, excess construction waste, human waste, general garbage etc.	Potential contamination and erosion impacts. Potential impact on flora and fauna.	L	E	4	L

Table 73 demonstrates that the concept design and proposed mitigation measures are anticipated to reduce the likelihood of detrimental environmental impact occurring as a result of the Project.

17.5 CONCLUSION

The key issues as identified by the DGR's (as discussed in Section 1.3) are:-

- Ecology
- Traffic and Access
- Noise and Vibration
- Hazards and Risks
- Heritage
- Soils and Contamination
- Air Quality

This is consistent with, and reflects key issues highlighted as a result of the ERA process. The ERA process also identified two other key issues being:-

- Social and Economic
- Visual

Other non-key issues identified by the ERA process beyond the key issues requiring assessment were:-

- Land Use
- Flooding and Hydrology
- Drainage and Water Quality
- Waste Management

Climate change and sustainability has also been considered as part of this report. The ERA process identified two extra key issues, and a number of non key issues, that were not identified in the Director-General's Requirements. Visual Amenity has been identified as a new key issue based on preliminary findings which highlighted potential visual impact from some residents within the Greta Township and potential community impact and concern this may have. Social and economic impact has been identified as a new key issue due to the significant positive impact that the Project would have on the local, regional and national economy.

The Residual Risk Analysis demonstrates that the proposed safeguards and management measures are anticipated to reduce the risk of environmental impact to an acceptable level.

18 DRAFT STATEMENT OF COMMITMENTS

18.1 INTRODUCTION

The Director General's Requirements issued for the Project required the inclusion of a draft Statement of Commitments (SOC) incorporating or otherwise capturing measure to avoid, minimise, manage, mitigate, off-set and/or monitor impacts identified in the impact Sections of the Environmental Assessment. The SOC must clearly articulate the desired environmental outcome of the commitment. The SOC must be achievable, measureable (with regard to compliance), and time specific where relevant. To meet these requirements a draft SOC is detailed below.

18.2 ENVIRONMENTAL PHILOSOPHY

Pacific National is governed by its policies which cover a range of issues relevant to the Project. Of particular relevance is their Integrated Safety Management System which details standards and procedures in the following key areas:-

- Waste Management
- Environmental Management
- Flora and Fauna Management
- Greenhouse Gas Management
- Air Quality Management
- Water Quality Management
- Heritage Management

These policies demonstrate that Pacific National is committed to the protection of the environment. The following Statement of Commitments is provided specifically for the Project and would provide additional environmental measures to minimise Pacific National's impact on the environment.

18.3 DRAFT STATEMENT OF COMMITMENTS

The following table details the draft Statement of Commitments for the Project. The NSW DOP would be the responsible approval agency for these commitments. All draft commitments are proposed to be undertaken by the Proponent.

Table 74 Draft Statement of Commitments

ISSUE	NO	COMMITMENT	TIMING
General	1	The Project shall be undertaken generally in accordance with the Environmental Assessment Report prepared for the Project by Monteath & Powys dated August 2010 and drawings accompanying the application.	Construction and Operation
	2	The facility will operate 24 hours a day seven (7) days a week	Operation
	3	Construction hours will be between 7:00am and 6:00pm Monday to Saturday. Some works may occur outside these hours due to interface requirements with ARTC's proposed third track or during commissioning. Where construction works are required outside of these hours the following measures would be implemented: • Inform neighbours of proposed works and timing • Keep works to a minimum • Where relevant engage an acoustic specialist to monitor potential acoustic impact within the locality	During Construction
	5	A Construction and Environmental Management Plan (CEMP) shall be prepared for the Project and implemented during the construction period. The CEMP shall ensure that all works on site are carried out in such a way as to minimise potential environmental impact through the implementation of best environmental practice. All personnel engaged in works on site shall comply with the terms and conditions of the CEMP.	Prior to Construction
	6	The proponent will comply with the requirements of the relevant public authorities and service providers in regard to the connection to, relocation and/or adjustment of services affected by the construction of the Project.	Prior to Operation

ISSUE	NO	COMMITMENT	TIMING
	7	The Project shall be staged in accordance with the Staging Plan prepared by SKM (Plan ref) Stage 1A - Access road. Stage 1B - Bulk Earthworks including blasting Stage 1C - Site facilities including:- - Tracks 1, 2 and 3. - Provisioning Facility to service three tracks. - Facility access road and infrastructure necessary to support provisioning (oil storage, fire systems including water tanks, water and electricity). - Diesel storage to be a minimum of 1.0 million litres (with allowance to grow to 2.0 million litres in Stages 2 and 3). - Wagon maintenance facility capable of basic administration and maintenance. - Road base area for wheel sets and bogies. - Locomotive maintenance facility access track on which a basic/temporary locomotive wash bay will be located. - Road Vehicles Service Centre. - Car Park. - Turnouts to main line. - Water quality system including detention basins. - Ancillary development including site fencing and access gate, landscaping etc. - A section of the proposed loco maintenance centre access siding to be equipped with a loco wash-down facility. The track length servicing this facility will be sufficient length to enable 160 metres of wagons to be stored between the wash-down and the dead end of the track. Stage 2 - Construction of maintenance and inspection Tracks 4 and 5. - Relocate locomotive wash bay towards future loco maintenance facility. - Construct wagon storage sidings. - Construct administration building. - Diesel storage to increase from 1.0 million litres to 2.0 million litres. - A shunting neck at the Brantxton end of the provisioning shed. Stage 3 - Locomotive maintenance facility. - Wheel lathe facility.	Construction and operation

ISSUE	NO	COMMITMENT	TIMING
Consultation and Communication	8	A 'Near Neighbour Consultation Strategy' for ongoing proactive engagement and communication with surrounding residents shall be implemented prior to construction of the Project. This strategy shall develop and implement policies which aim to increase project knowledge and create effective communication mechanisms.	Prior to Construction
	9	A Project 'hotline' shall be established, and the phone number distributed to residents prior to the commencement of construction on site to allow residents to lodge any complaints. All phone calls to the Project 'hotline' shall be documented and where relevant acted on.	Prior to Construction
	10	The Stakeholder and Community Liaison Plan shall be monitored and where required, amended.	Prior to Construction
Ecology	11	It is recognised that impacts on endangered ecological communities and habitat for threatened fauna species could not be avoided in the northern half of the site due to the narrow width of the site. The flora and fauna assessment prepared by SKM (March, 2010) has identified and quantified the impacts on biodiversity which includes the loss of 18.5 ha of vegetation including state listed endangered ecological communities and habitat for state and federal listed threatened fauna. The Project should therefore aim to use this information in considering the selection of appropriate compensatory or offset habitat. Any proposed offset strategy should aim to replace residual impacts by seeking an area of vegetation of similar size and condition to that being lost in the local area if possible or in proximity to the site, which may also consider restoration of adjacent degraded areas.	12 months following operation
	12	There is considerable scope to restore and re-vegetate degraded and cleared portions of the site outside of the development footprint. In this regard an Ecological Restoration and Management Plan should be developed that focuses on restoring the riparian vegetation on the site as well as active planting and regeneration of currently cleared lands and the closure and rehabilitation of existing vehicle and recreational tracks. The plan should be prepared prior to construction and will identify the areas of focus, provide a set of objectives and actions required to restore, maintain and monitor the success of the plan with an adaptive approach. The restoration plantings should aim to maintain local genetic uniqueness through the collection of seed on the site prior to clearing and plant species characteristic of the EEC's to be cleared.	Construction
	13	The Ecological Restoration and Management Plan should outline measures to monitor the impacts of the construction and success of the restoration activities on the flora and fauna of the site. The monitoring program should include a schedule of progress reports, bi-monthly during construction and then 12 months, 24 months, and 36 months post construction.	

ISSUE	NO	COMMITMENT	TIMING
	14	A survey of hollow-bearing habitat trees as well as nest/dormitory sites for the Grey-crowned Babbler will be required prior to the final design and construction of the internal road and facilities to refine the footprint of these structures where possible to avoid these features. Data on the number of tree hollows lost could be used for developing a nest box replacement program to be implemented as part of the ecological restoration plan. The plan should detail the number and location of nest boxes to be placed on the site and target species, as well as suggestions for monitoring and maintenance.	Construction
	15	Install speed reduction measures along the internal access road, wildlife signage and sensor lighting to minimise disturbance from noise and lighting on nocturnal fauna, particularly the Squirrel Glider. The Ecological Restoration and Management Plan should include landscaping along the road verges and disturbed edges of the development.	Construction and Operation
	16	Habitat on the site containing Spotted Gum (<i>Corymbia maculata</i>) has been identified as critical or essential foraging habitat for the Grey-headed Flying-fox (DECCW 2009) due to the fact that this tree species is productive during winter (May-Sept) at a time when food bottlenecks for flying foxes have been identified (Parry-Jones and Augee 1991 and Eby <i>et al</i> 1999). While the removal of Spotted Gum forest for this project was assessed as a non-significant impact for the long-term persistence of this species in the region, to further minimise potential impacts it is appropriate to instigate a strategy that avoids removal during the winter if possible. If not possible due to timing of approval then aim for gradual removal of Spotted Gum to allow re-adjustment by foraging Grey-headed Flying-fox as a precautionary measure. The following approach is recommended:- 1) Prioritise clearing of the site for September through to April 2) If clearing is required in winter, May through to August, then this should be staged over a four week period, with no more than 25% of the total existing vegetation being cleared each week. In clearing vegetation in this period, a suitably qualified ecologist should supervise the following steps:- – Other forest types should be removed initially in preference to Spotted Gums. – Large mature Spotted Gum which are in flower should be retained for as long as possible during the clearing period. – Areas with a high density of Spotted Gum should be cleared gradually over the four weeks. – Flowering trees should be identified. – The ecologist should nominate the priority for trees to be cleared within the above framework based on their value as foraging habitat for Grey-headed Flying-fox.	Construction

ISSUE	NO	COMMITMENT	TIMING
	17	Proposed environmental off-sets should consider the principals as set out in DEWHA (2007). In this respect, the proposed offset site should aim to conserve a large area of remnant Spotted Gum (<i>Corymbia maculata</i>) and/ or Forest Red Gum (<i>Eucalyptus tereticornis</i>) given their recognised value as important or critical foraging habitat for the Grey-headed Flying-fox.	Operation
	18	Weed management is to be developed as part of the on-site Environmental Management.	
	19	Where possible, dead wood and dead trees would be relocated to adjacent areas of habitat.	
	20	New watercourse crossings associated with the project need to meet NSW Fisheries Guidelines, which aim to ensure passage for aquatic biota is maintained.	

ISSUE	NO	COMMITMENT	TIMING
Traffic and Access	21	A Construction Traffic Management Plan (CTMP) shall be prepared to manage construction traffic for the Project. The CTMP shall include such measures as:- • Allowing staff movements after 6.00am and before 7.00pm on construction days to manage traffic loads on local roads and the intersection of Nelson Street and the New England Highway • Make available a copy of the CTMP to all staff and contractors. The following arrangements are recommended to be contained within the CTMP: • Workers travelling by private car are to turn right on Nelson Street and use the road to Lovedale to avoid using the critical junction with the New England Highway. This route is considered satisfactory and appropriate for many destinations further to the east such as Kurri Kurri, Lake Macquarie and Newcastle. • Stagger the release of cars from the site that still need to use the New England Highway / Nelson Street intersection, 10 cars every 5 minutes • Ensure that cars leaving the site that use the Nelson Street intersection turn left before using intersections further west to turn around to head back to Maitland. (This arrangement has been previously recommended as a suitable temporary form of traffic management of the subject site.) In addition to the above the following could also assist in improving traffic management under the temporary conditions created during project construction; • Employees cars could be clearly physically identified combined with recording number plates and car details (if required). • A traffic monitoring crew could be employed between 4.30PM and – 6PM. • Monitors would ensure that cars leave the site at staggered time intervals, 10 cars every 5 minutes • Monitor the intersection of Nelson Street and ensure that no vehicles identified from the PN site would be turning right out of Nelson Street. The above control of employees vehicles could form part of the site's OH&S System. • Where possible arrange for material to be delivered to the site outside of peak traffic times on the New England Highway.	Prior to Construction

ISSUE	NO	COMMITMENT	TIMING
	22	In the event that construction of the Project commences prior to ARTC's realignment of Nelson Street structural investigations shall be undertaken and discussions held with Council to determine the load limit for the Anvil Creek Bridge. The load limit sign should be posted at the bridge. Where construction vehicles shall exceed the load limit on the bridge, the Construction Traffic Management Plan shall direct them to use Camp Road.	Construction
	23	A Traffic Management Plan (TMP) shall be prepared for Project operations. The TMP could include the following measures to discourage and reduce the number of vehicles exposed to the Nelson Street and New England Highway intersection during the peak PM period:- • Deliveries involving heavy vehicles will be made between the hours of 6.00am and 10.00pm, except where an emergency exists • Promote car pooling and shared vehicles trips for day shift workers. • Encourage staff to utilise Camp Road when leaving in the PM peak period. • Onsite Traffic speeds should be capped at 40Km/h.	Prior to Operation
	24	No B-Doubles shall access the site via Nelson Street until Nelson Street is a designated B-Double route.	Construction and Operation
	25	A minimum of 80 car parking spaces shall be provided on site, incorporating a minimum of 75 car parking spaces adjacent to the administration facility, three (3) spaces adjacent to the Locomotive Maintenance Facility and two (2) spaces adjacent to the Provisioning Facility. All car parking spaces on site shall be provided in accordance with the relevant Australian Standard.	Prior to Operation
Noise and Vibration	26	A Construction Noise Management Plan (CNMP) shall be developed in conjunction with the detailed construction program such that operational controls may be implemented to minimise potential noise impacts during the construction stage. The Interim Construction Noise Guideline (DECC, 2009) provides recommendations for the management of noise from construction works and examples of common mitigation techniques.	Prior to Construction

ISSUE	NO	COMMITMENT	TIMING
	27	A Noise Management Policy (NMP) shall be prepared for the operations of the site. The NMP policy shall be discussed and explained to the adjoining land owners. The consent of the majority of the land owners in Lots 1 and 2, DP882276 and Lots 3-7, DP1144291 shall be required to bind the plan. The following terms will be included within the NMP:- • All reasonable attempts shall be made by Pacific National to gain consent from the majority of owners. • Agreement must be reached in six months from the commencement of negotiations, which may commence prior to consent of the facility. • If no agreement is reached the regulator's mitigating conditions shall be applied to the site to allow the facility to proceed. • The majority of owners on the site shall be required to bring effect to the document, the majority shall be based on lots not on owners as there are lots owned by multiple owners. • Should compensation be paid due to loss of amenity this shall be ratified by an appropriate expert, such as registered valuer, acoustic building consultant or acoustic engineer. • The regulator (DECCW) will be involved in any discussions.	Operation
	28	A noise barrier shall be constructed adjacent to receivers at the site entrance to mitigate the noise impact associated with road vehicles accessing the site. The barrier shall be approximately 3 metres high and run parallel to the internal roadway between the roadway and the receivers to the east as proposed in Advitech's Noise Impact Assessment Report (July, 2010).	During Construction and prior to operation
	29	All maintenance activities on the three shunting necks in the southern section of the site shall only be undertaken between 6:00am and 10:00pm.	Operation
	30	The Project has been designed to minimise the need for shunting activities to take place on site. Shunting activities are unlikely to occur on site on a regular basis as the facilities on site are designed to accommodate whole trains. Where shunting activities would be required operational measures would be implemented to minimise the generation of impulsive noise associated with the impact of empty wagons.	Operation
	31	The proponent shall undertake consultation with ARTC to determine an acceptable impact criterion prior to commencement of construction works. Detailed blast designs shall be undertaken to ensure compliance with this criterion.	Prior to construction.

ISSUE	NO	COMMITMENT	TIMING
Hazards and Risks	32	The methods contained in AS2187.2-2006 shall be utilised by the proponent to manage blasting in such a way as to minimise ground vibration and overpressure impacts. These methods include: • reducing the maximum instantaneous charge; • using appropriate delays; • establishing blast times in accordance with prevailing meteorological conditions; • keeping face heights to a practical minimum; • optimising blast design; • ensuring stemming types and lengths are adequate; and • orienting blasts away from receivers (where possible).	During construction.
	33	The construction contractor shall prepare a Blast Management Plan, and include provisions for: • monitoring overpressure and ground vibration; • feedback loops to modify blast design where monitoring indicates impacts are above the criteria; and • receiving, investigating and responding to complaints.	Prior to construction.
	34	Flammable and combustible storage depots shall be located on site in accordance with Australian Standard, <i>AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids</i>. The diesel tank shall be located at least one-sixth of the diameter of the tank or 1 metre, whichever is the greater, from any other flammable or combustible storage depot. The oil shall be located at least 1 metre from any other flammable or combustible storage depot. The paint shall be located at least 3 metres from any other flammable or combustible storage depot. The design of flammable liquid storage on the site shall be certified by an appropriately qualified and experienced person.	During Detailed Design
	35	The 40 metre Isopach shall be identified on site with all operations on the site to be restricted to areas where depth to mining is greater than 40 metres, except where mine subsidence management programmes have been developed and implemented.	Prior to Construction
	36	<u>Area 1, Access Road</u> • The mine voids beneath Area 1 should be fully grouted and any existing piping within the soils should be eliminated by grouting, by over-excavation and recompaction or by forced collapse by means of dynamic compaction. • Grouting and soil improvement works would need to extend at least 5m each side of the access road.	During Construction

ISSUE	NO	COMMITMENT	TIMING
	37	<u>Area 2, Access Road</u> • The use of a continuously reinforced, possibly post-tensioned, concrete pavement designed to span a 5m void is recommended for Area 2 where the depth of cover is less than 20m. • Site improvements to minimise piping erosion, together with monitoring of the access road area for the incidence of pothole subsidence, should include the measures described below: - Excavation of the footprint of the Access Road and additional 5m each side of the footprint, to the top of very low strength, or better, rock. The anticipated depth of excavation in Area 2 is about 1m to 3m, based on the logging of the recent non-core bores. The depths would need to be confirmed during construction; - Over-excavation of any cracks or rubble chimneys and backfilling with dental concrete to seal the rock surface against soil and water inflow; - Placement of about 150mm blinding layer of sand; - Placement of a grout of coax cable for the time-domain reflectometry to detect pothole formation at the top of the bedrock. The coax should be covered with a blinding layer of about 150mm of sand; - Place heavy duty geotextile filter cloth over the blinding layer prior to placing general filling; - Three layers of soil reinforcing geogrids should be included in the lower 450mm to 500mm of general filling above the sand blinding layer; - If the monitoring detects the onset of pothole subsidence then remedial grouting would be required to grout the rubble chimney/void.	During Construction
	38	<u>Area 3, Turnout from Main Line</u> • The abandoned tunnel headings under the central section of the turnout need to be located and backfilled. Depending on the depth of cover this could be undertaken by bulk earthworks or drilling and grouting. • There is little risk of future potholing over the limited board and pillar workings with less than 20m cover at the northern end of the siding. It is however, noted that any pothole subsidence in this area, if it occurred, would cause shutdown of the facility. Hence it is suggested that grouting be undertaken to backfill these workings under and within 5m of the footprint of the siding, notwithstanding that future pothole subsidence is considered very unlikely in this area.	During Construction

ISSUE	NO	COMMITMENT	TIMING
	39	<u>Wagon Storage Roads</u> - Excavation of the footprint of the wagon storage roads (where the cover depth is less than 20m), and an additional 5m each side beyond the footprint, to the top of very low strength, or better, rock; the anticipated depth of excavation is about 1m to 3m, based on the logging of the recent non-core bores; the depth would need to be confirmed during construction; - Over excavation of any cracks or rubble chimneys and backfilling with dental concrete to seal the rock surface against soil and water inflow; - Backfill the excavation up to subgrade level using the excavated soil and weathered rock, places and compacts under engineering control.	During Construction
	40	Defendable spaces shall be provided around the buildings on site as proposed by the ABPP report (March, 2010) and as detailed below:- - Southwest of the facilities on site - Defendable space of minimum 17 metres to be provided to the southwest of the locomotive wash facility, locomotive maintenance facility, wheel lathe, administration building and provisioning shed. - South of the Administration facility and wheel lathe facility - Defendable space of minimum width 17 metres to be provided to the south of the wheel lathe and administration building. - Southeast of the administration facility and wheel lathe facility - Defendable space of minimum width 21 metres to be provided to the southeast of the administration facility and wheel lathe facility. - Northwest of Provisioning Shed - Defendable space of minimum of width 21 metres to be provided to the northwest of the provisioning shed.	Prior to Operation
	41	The management of defendable spaces and landscaped areas within the Project shall comply with the following:- - Maintain a clear area of lawn or pavement adjacent to the buildings. - Utilise non-flammable materials such as scoria, pebbles and recycled crushed bricks as ground cover to landscaped gardens in close proximity to buildings. - Keep areas under shrubs and trees raked and clear of combustible fuels. - Trees and shrubs shall be maintained in such a manner that tree canopies are separated by 2 metres and understorey vegetation in not continuous.	Operation
	42	Buildings shall be constructed to comply with level 3 construction specifications as defined by Australian Standard AS 3959 – 1999 'Construction of Buildings in Bushfire Prone Areas'.	Construction

ISSUE	NO	COMMITMENT	TIMING
	43	Access doors (PA and Vehicle) to the buildings shall be fitted with seals that seal the bottom, stiles and head of the door against the opening/frame to prevent the entry of embers into the buildings. Particular attention shall be paid to the gap at the head of the curtain of the roller doors, where mohair type seals can be used.	Construction
	44	Any external vents, grilles and ventilation louvers shall have stainless steel mesh with a maximum aperture of 2mm square fitted to prevent the entry of embers into the building or be fitted with a louver system which can be closed in order to maintain a maximum aperture or gap of no more than 2mm.	Construction
	45	Roof ventilators shall be fitted with stainless steel flymesh (2mm aperture) to prevent the entry of embers into the building or be fitted with a louver system which can be closed in order to maintain a maximum aperture or gap of more than 2mm.	Construction
	46	The Fuel Storage and Trade/Waste Recycle facilities shall be constructed/managed in order to prevent ignition of fuel and combustible materials by burning embers. Consideration shall be given to the installation of 'wet-down' sprinklers which can be used to douse burning embers and reduce the radiant heat levels on these facilities.	Operation
	47	The fire fighting water supply to the proposed facility shall comply with the Building Code of Australia (BCA) and Australian Standards A.S. 2419.1 – 2005.	Prior to Operation
	48	An Evacuation Plan will be developed for the site, this shall include evacuation in the event of a bushfire.	Prior to operation
	49	A Plan of Management which addresses the likely impact from the identified emergencies, on the assets on the site so as to minimise loss/damage to the infrastructure and movable assets shall be prepared.	Prior to operation
	50	A Bushfire Management Plan which provides the protocols for the management of combustible fuels in the retained Lower Hunter Spotted Gum-Ironbark Forest shall be prepared.	Prior to operation
	51	The provision of access roads within the facility shall be constructed, as a minimum, to the deemed-to-satisfy provisions of Section 4.1.3(2) of <i>Planning for Bushfire Protection 2006</i> .	During Construction
	52	The Fuel Storage and Trade Waste/Recycle facilities shall be constructed/managed in order to prevent ignition of fuel and combustible materials by burning embers. Consideration shall be given to the installation of 'wet-down' sprinklers which can be used to douse burning embers and reduce the radiant heat levels on these facilities.	Operation
Heritage		All collected and salvaged material shall be analysed and added to the existing data set, with a report produced on the salvage process, and analysis and discussion of the artefact data.	During Construction
	53	Pacific National will investigate formalising the protected portions of the Sawyers Creek Artefact Scatter 1 and 2 (AHIMS# 37-6- 2165 and #37-6-2164). Pacific National will also include these sites on their Heritage Register.	

ISSUE	NO	COMMITMENT	TIMING
	54	Pacific National will include Aboriginal cultural heritage material in their induction for this project for all personnel and contractors involved in construction and operation of the Greta Train Support Facility. The registered Aboriginal stakeholders will assist in preparing this and could be engaged to assist in this.	
	55	Salvage excavation shall take place prior to ground breaking activities within the areas identified as Potential Archaeological Deposits.	Construction
	56	An archaeologist shall be present on site during excavation of AHIMS Site no. 37-6-2165 and 37-6-2164.	Construction
	57	AHIMS Site no. 37-6-2165 (Sawyers Creek Artefact Scatter 1) shall be managed as follows:- - All artefacts identified to date within the proposed impact zone shall be collected. Representatives of the registered stakeholders shall be invited to take part in this collection, in recognition of the cultural significance of this site. - The remainder of the site (artefacts and PAD) to the west should be protected. Protection should take the form of some sort of robust, permanent, highly visible fencing and be put in place prior to construction work taking place. Pacific National may like to consider a local Indigenous company to undertake this work. Pacific National should ensure that everyone who enters the study area is made aware of this fencing and that it is a „no-go zone“ – the area should be marked on all plans, including the Safety, Health and Environment Plan. No construction activities should take place inside this fenced „no-go zone“, including vehicle movement, laying down of fill materials, etc. Pacific National is committed to the protection of and preservation of heritage items and sites on land which it owns (see Heritage Management Standard in Pacific National’s Integrated Safety Management System). In line with this, the protective fencing on this site should be left in place and, if necessary, maintained for the duration of operation of the Train Support Facility.	During Construction

ISSUE	NO	COMMITMENT	TIMING
	58	AHIMS Site no. 37-6-2164 (Sawyers Creek Artefact Scatter 2) shall be managed as follows:- • All artefacts identified to date within the proposed impact zone shall be collected. • In the area of intact dense deposit on the banks of Sawyers Creek controlled manual salvage excavation shall be undertaken. This shall take the form of a series of 4-6 interconnected 1m x 1m excavation squares to open up the location of and explore the nature of the deposit, including attempting to identify any stratified features and deposit. If concentrations greater than 150 artefacts per square metre are encountered and/or <i>in situ</i> features such as knapping floors or hearths, then a further two 1m x 1m excavation squares shall be excavated around the location. If possible, appropriate samples shall be collected for radiocarbon dating. The location of transects/trenches shall be decided upon in the field by the archaeologist. All excavated sediment shall be sieved. The process shall be recorded in detail.	

ISSUE	NO	COMMITMENT	TIMING
	59	- In the other two areas of disturbed dense deposit, controlled mechanical salvage excavation shall be undertaken. Excavation shall be undertaken by machine excavator equipped with a ~90 cm wide mud bucket. Excavation shall be undertaken in a series of 2-3 adjacent 5 m long trenches in each location, each excavated in 5 cm spits to sterile basal clay/gravel deposits (usually 20cm – 30cm). The location of transects/trenches shall be decided upon in the field by the archaeologist. If concentrations greater than 150 artefacts per square metre are encountered and/or <i>in situ</i> features such as knapping floors or hearths, then a further two 1m x 1m excavation squares shall be excavated around the location. Excavation shall be fully documented and recorded. All excavated deposit shall be sieved using a mechanical sieve fitted with ~ 4 mm gauge punched metal plate or mesh. - Representatives of the registered stakeholders shall be invited to take part in the above collection and salvage, in recognition of the cultural significance of this site and the educational opportunities it presents. - Detailed analysis of all material and any dates recovered from the site shall be undertaken, the results of which shall form, with the results already displayed in the Indigenous Heritage Assessment (SKM, 2010), part of a detailed technical report. - The AHIMS site card for this site shall be updated within six weeks of the completion of salvage excavation. - The remainder of the site (artefacts and PAD) to the west, which is not affected by construction, should be protected. Protection should take the form of some sort of robust, permanent, highly visible fencing and be put in place prior to construction work taking place. Pacific National may like to consider a local Indigenous company to undertake this work. Pacific National should ensure that everyone who enters the study area is made aware of this fencing and that it is a „no-go zone“ – the area should be marked on all plans, including the Safety, Health and Environment Plan. No construction activities should take place inside this fenced „no-go zone“, including vehicle movement, etc. Pacific National is committed to the protection of and preservation of heritage items and sites on land which it owns (see Heritage Management Standard in Pacific National's Integrated Safety Management System). In line with this, the protective fencing on this site should be left in place and, if necessary, maintained for the duration of operation of the Train Support Facility. Additionally, to aid in protecting this area, fill material may be spread across the area and revegetated.	During Construction

ISSUE	NO	COMMITMENT	TIMING
	60	At any time during construction, if Aboriginal cultural heritage material features and/or deposits are found, all construction that could potentially harm the cultural heritage must cease (including stopping all construction within at least but not limited to 10 metres). Only construction that is required to comply with occupational and environmental health and safety standards and/or to protect the cultural heritage shall occur. Construction may recommence when the archaeologist has deemed that appropriate mitigation or salvage has occurred. Where Aboriginal cultural heritage material and/or deposits are discovered in the activity area, the sponsor must engage an archaeologist to record in detail the location and context of the material and decide if the material forms a new site or is part of a previously recorded site. The archaeologist must complete and submit relevant AHIMS recording forms to DECCW. The archaeologist shall facilitate the involvement of the registered Aboriginal stakeholders and in consultation decide the most appropriate course of action for the material. This may include reburial of the material in a durable container to an area unlikely to be disturbed. If reburial is undertaken, the location of this shall be recorded and all documentation provided with an updated AHIMS site card. If the cultural heritage material and/or deposits found are deemed to be <i>in situ</i> and of moderate or higher significance, it is preferable to avoid impact if possible. If avoidance is not possible, a suitably qualified and experienced archaeologist must be engaged to conduct salvage excavation. The archaeologist must facilitate the involvement of the registered Aboriginal stakeholders and develop a suitable methodology for salvage excavation in consultation with them. This may include, but not be limited to, a 1m x 1m manually excavated trench (or more trenches of differing dimensions where appropriate and necessary) surrounding and encompassing the material/deposit, proceeding stratigraphically where possible and if not, in 5cm spits. This shall also include, where possible and appropriate, collection of samples suitable for radiometric dating. The archaeologist and the registered Aboriginal stakeholders shall then agree on the most appropriate course of action for the salvaged material and appropriate custodianship.	
	61	The results of non-Indigenous archaeological testing and excavation indicate a low significance and no further sub surface investigation is recommended. However, it is recommended that the remaining (25) un-recorded features are fully recorded prior to work commencing on the site to provide a full record for future heritage reference. This recording would be non-invasive, be undertaken by an archaeologist, and comprise the taking of relevant dimensions, associated features and/or artefacts, and photographs. This recording should be detailed in a brief addendum to the Historical Heritage Assessment Report.	
	62	In the vicinity of the area identified as the 'street of miners' cottages' works should cease on site if features are found that are not consistent with the occupation of cottages.	Construction

ISSUE	NO	COMMITMENT	TIMING
Soils and Contamination	63	An Erosion and Sediment Control Plan (ESCP) shall be prepared for the Project by the construction contractor in accordance with the NSW Department of Housing “ <i>Managing Urban Stormwater – Soils and Construction</i> ” (<i>Blue Book</i>). The ESCP shall aim to; prevent erosion, restrict sediment movement, avoid sediment in run-off and control run off.	Construction
	64	The fill materials identified in the Preliminary Contamination Assessment prepared by Douglas Partners (December, 2009) shall be investigated further to assess their suitability to remain on site. This investigation shall be undertaken during the early stages of construction. If other fill materials are encountered on site during construction, the assessment of these materials shall be undertaken at that time.	During Construction
	65	Further monitoring of Methane Gas during site investigations shall be undertaken. This will comprise monitoring of methane levels at the surface and within excavations/bore holes that intercept mine workings during site investigations and construction. Monitoring shall be conducted by suitably qualified and experienced personnel. If elevated methane levels are detected during further monitoring, standard mitigation measures such as cap and contain (i.e. physical barrier to control migration) or controlled extraction could be conducted if further management of methane is required. This shall be done in consultation with the NSW Department of Primary Industry.	Construction
Air Quality	66	Clearing should be undertaken as required with minimum time between clearing and the commencement of bulk earthworks.	Construction
	67	In periods of high wind, or when high winds are forecast, stripping of soil shall cease and any areas which may generate excessive dust shall be watered to control dust emissions.	During Construction
	68	Water application shall be used on site to increase soil moisture during stripping of soil and minimise dust generation.	During Construction
	69	Re-vegetation of areas shall be undertaken as soon as practicable following the completion of landform preparation to assist in stabilising the exposed surface	During Construction
	70	A water tanker shall be used to suppress dust on internal roads, cleared areas and stockpiles as required	During Construction
	71	In periods of adverse meteorological conditions works on site shall be modified or ceased to reduce potential air quality impacts.	During Construction
Visual	72	Ongoing observation of dust generation and application of dust control shall be undertaken on site as required	During Construction
	73	Landscaping of the Project should be undertaken generally in accordance with the Landscape Masterplan prepared for the Project.	During Construction
	74	Lighting on site shall be designed to meet the requirements of AS4282: Control of Obtrusive effects of Outdoor Lighting.	Construction

ISSUE	NO	COMMITMENT	TIMING
Waste Management	75	A detailed Waste Management Plan (WMP) shall be prepared for both construction and operation. The WMP shall contain detailed management measures. Waste material on site shall be sorted and where possible, recycled to minimise delivery of construction materials to landfill. The following general measures shall be included within the WMP: • Excavated material shall be re-used on site. If offsite disposal is required, it shall be detailed in the WMP. • Topsoil shall be reused in re-vegetation of cleared areas and where practical, vegetative matter (excluding weeds) shall be chipped and reused as mulch onsite. Logs and tree limbs suitable for habitat and or fauna refuge shall be collected during clearing and placed in an area of the site to be re-vegetated. • Where possible, waste materials shall be recycled and/or reused on site. If this is not possible, they shall be transported to an approved recycling or waste management facility, as appropriate. • Waste bins, including recycling bins, shall be provided throughout the construction site, and in designated areas during operation. • During operation and construction, waste shall be transported from the site when storage facilities are filled. The waste storage area shall be kept tidy and well maintained. • Liquid waste such as chemicals, fuel and lubricants, and their containers, shall be disposed of in accordance with the relevant requirements. • During construction, portable toilet facilities shall be installed on site and emptied periodically by an approved contractor.	Construction and Operation
Flooding and Hydrology	76	The crossing over Sawyers Creek shall be designed and constructed above the 1 in 100 year flood event for the site.	Construction and Prior to Operation
	77	The contractor must clearly mark on the ground, the boundaries of the area of the crossing of Sawyers Creek prior to the commencement of any works and maintain those markings until the works are complete in order to maintain and protect vegetation growing along the toe and face of the riverbank outside of the area of works.	Construction
	78	The contractor must relocate any unused or excess materials at least 20 metres from the river and/or outside the designated riparian corridor.	Construction
	79	The contractor must not put materials in the drainage line or river or in any area that has existing native vegetation and or that is identified as part of the riparian corridor.	Construction
	80	The contractor must use only biodegradable materials for any only erosion control matting within the riparian corridor.	Construction

ISSUE	NO	COMMITMENT	TIMING
	81	The contractor must not use wire mesh structures, concrete, spray concrete, concrete grouting, crib walling or car types for bank stabilisation.	Construction
	82	The Project shall be designed to meet the relevant environmental standards for bunded chemical/fuel storage facilities, regular monitoring and leak detection systems, waste management procedures etc to minimise the potential of the Project to impact on groundwater quality.	Construction and Operation
	83	In the event that groundwater from old mine workings is brought to the surface through grouting, it shall be managed via re-use on site in the grouting process, re-injection to the mine or appropriate treatment and disposal.	Construction
	84	A Surface Water Management Plan (SWMP) has been prepared for the Project and shall be implemented. The SWMP incorporates a range of preventative, treatment and contingency measures for the Project.	Operation
	85	A Rainwater Harvesting Scheme shall be implemented to supplement the on-site non-potable water requirements for both toilet flushing and locomotive washing. This shall incorporate:- • Rainwater will be harvested from the roofs of all on-site buildings. • Harvested rainwater from the Administration building, Wheel Lathe facility and the Provisioning Shed will be re-used for toilet flushing in each respective building. • Harvested rainwater from the Locomotive, Road Vehicle and Wagon Maintenance Sheds and the Locomotive Wash Facility will be reused for toilet flushing in each building as well as to supplement the water requirements for the Locomotive Wash Facility.	Operation
	86	Run-off from the infrastructure and maintenance area shall be pre-treated in a Gross Pollutant Trap with oil and grease removal capabilities prior to treatment in the Water Quality Control Ponds (WQCPs).	Construction
	87	All surface runoff from the Project will be treated in WQCPs prior to discharge. The WQCPs shall be designed to achieve an 80% reduction in suspended sediment levels and remove low to moderate concentrations of heavy metals and oils and greases.	Construction
	88	A Maintenance Plan shall be development for the WQCPs and Rainwater Harvesting Scheme.	Prior to Operation
	89	All water generated from the locomotive wash facility and from internal water use in workshops will be reticulated to an on-site treatment plant. The treatment plant will comprise a gravity separation tank and a coalescing plate separator. The plant will be designed to treat the trade waste to a suitable quality for disposal either on site or under a trade waste agreement with Hunter Water Corporation.	Operation

ISSUE	NO	COMMITMENT	TIMING												
	90	A monitoring program shall be implemented for an initial two year period of operation. Following this period, the monitoring plan shall be reviewed in liaison with the relevant government authority. The following mean concentrations for each analyte included shall be used as the proposed benchmark. <table><tr><th>ANALYTES</th><th>MEAN CONCENTRATION</th></tr><tr><td>pH</td><td>6.5 to 8.0</td></tr><tr><td>EC</td><td>670 µs/cm</td></tr><tr><td>Total Suspended Solids</td><td>25 mg/l</td></tr><tr><td>Key Metals (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg, Co, Be, Ba, Mn, Mo, Se, SN, Ag, B)</td><td>ANZECC Guideline Trigger values for 80% level of protection for freshwater Species</td></tr><tr><td>Total Oil and Grease</td><td>10 mg/l</td></tr></table> If water quality trends exceed the benchmark concentrations presented above, the following contingency measures shall be implemented:- - Increased monitoring frequency and sampling points to identify and confirm the source of any suspected degradation to water quality. - Review the SWMP in order to identify opportunities to improve or rectify any identified problem. The data collected as part of the monitoring program will enable fully informed decisions to be made. Potential measures that could be implemented are: - Applying a flocculating agent into the inlet pond to enhance the sedimentation rate. - If oil and grease concentrations are higher than expected, an oil and grease separator could be installed between the inlet pond and macrophyte zone of the WQCPs. - Adjust operation procedures to eliminate the source of any identified problem. - If any component of the surface water management framework is identified as creating an unacceptable environmental impact, remedial actions will be established in close liaison with the relevant authority.	ANALYTES	MEAN CONCENTRATION	pH	6.5 to 8.0	EC	670 µs/cm	Total Suspended Solids	25 mg/l	Key Metals (As, Cd, Cr, Cu, Ni, Pb, Zn, Hg, Co, Be, Ba, Mn, Mo, Se, SN, Ag, B)	ANZECC Guideline Trigger values for 80% level of protection for freshwater Species	Total Oil and Grease	10 mg/l	Operation
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ISSUE	NO	COMMITMENT	TIMING
	91	In the event a spill on site occurs the following measures shall be implemented:- • If possible, the spill will be contained at the spill location and remediated using a spill kit. • If a spill does enter into the drainage system, the drainage system will be sealed (<i>with sandbags and an impermeable liner</i>) at either an access pit or the pipe outlet. Flushing may be required to wash any contamination through the drainage system. All collected liquid will be pumped from the piped drainage into the trade waste holding tank. Testing shall be undertaken to identify the chemical properties of the spill and determine the most suitable treatment and disposal option. If the spilled material comprises fuel or oil, the collected liquid could be treated in the on-site trade waste treatment facility and disposed under the trade waste agreement. If the spill contains chemicals that are not suitable for discharge under the trade waste agreement, then contaminated liquid shall be transported to an appropriate off-site liquid waste disposal facility. • Any contamination entering the WQCPs shall be contained in the inlet pond, which will only be hydraulically connected to the macrophyte zone during wet weather periods. If this occurs, the contained water in the inlet pond will be remediated. Depending on the nature of the contamination and the water volume, specialised equipment may be required.	Operation
Sustainability	92	Passive and active design features shall be used throughout the buildings on site to achieve the functional outcomes of the building including energy efficient fixtures, passive thermal conductivity, use of Low-Volatile Organic Compounds (VOC) paints, floor finishes, sealants and adhesives to minimise the VOC emissions, glazing etc.	During Construction
	93	Water conservation and water cycle management measures such as energy efficient fixtures and rainwater harvesting, shall be incorporated into the detailed design for the Project.	Detailed design

19 CONCLUSION

This document has presented an environmental assessment of a Train Support Facility located in Greta. The report has found that the subject site is suitable for the Project taking into account the following matters. The site is well located in terms of proximity to the Main Northern Railway Line. The proposed Hunter Expressway and ARTC's proposed third track would result in an intensification of linear infrastructure within the locality. The Project is an appropriate land use in the context of these two developments.

The Project is consistent with the objects of the EP&A Act and the relevant state and local policies. The site is appropriately zoned for the Project and the Project does not raise any issues that conflict with any state or local environmental planning instruments. A number of mitigation measures have been put forward to manage the potential impact of the Project on the environment. These mitigation measures would minimise any residual impact of the Project.

During construction phases the Project has the potential to result in some impacts. These impacts relate to dust and noise during the earthworks phase, and traffic during the erection of buildings and site facilities. It is important to note that these impacts are short term only and transient as construction moves along the site. Further, mitigation measures have been included to manage any potential impact. Following implementation of the identified mitigation measures, it is considered that there would be minimal construction impacts within the locality as a result of the Project.

Overall, it is considered that this Environmental Assessment Report meets the DGR's and Supplementary DGR's issued for the Project.

The assessment found that during operation of the Project no significant adverse impacts are expected. The Project would result in a positive economic and social impact within the locality and is therefore an appropriate development.